48

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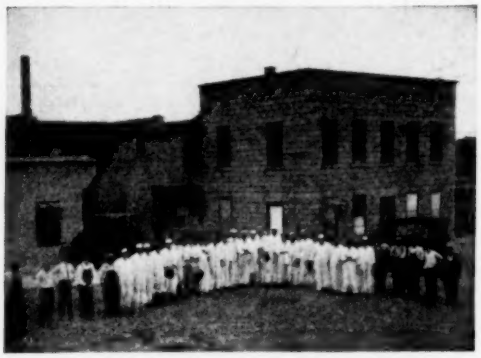
CORN STATES
in the MARCH OF PROGRESS



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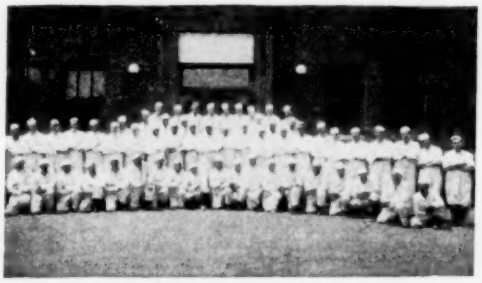

The laboratory in which this personnel labors in 1939 may be left to the imagination

Since this early beginning progress was made step by step with each advance in the laboratory methods which have given the veterinary profession serum and virus of the highest immunizing value and in ample quantity to provide for any emergency in any part of the Cornbelt territory and beyond. The part played by the Corn States personnel in this "March of Progress" is an open book of American swine production.

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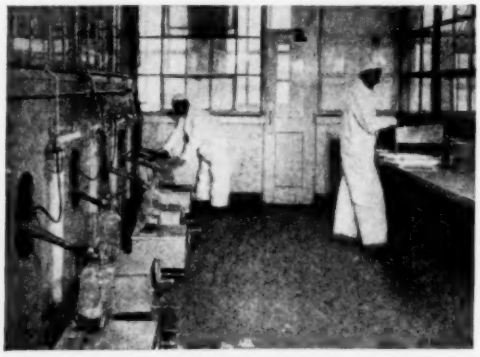

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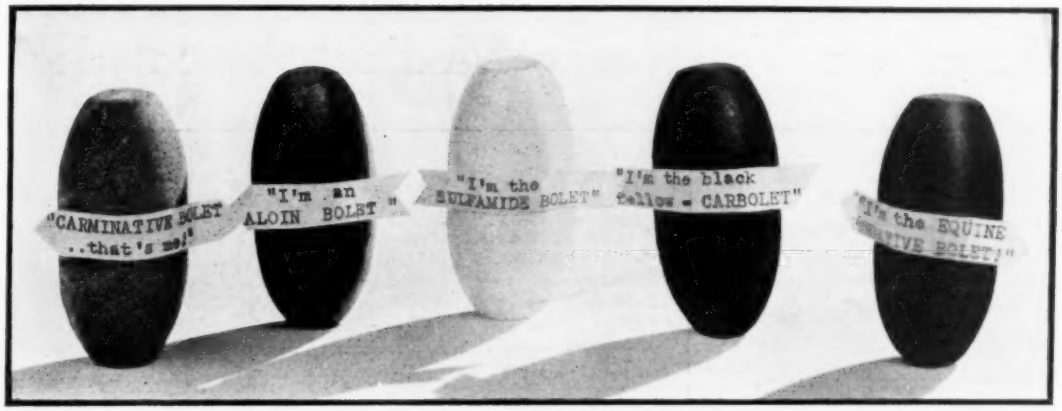
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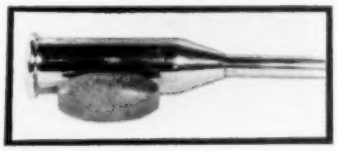

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Vol. XCV **JULY, 1939** **No. 448**

A Message from President Bergman on

The Seventy-Sixth Annual Meeting of the A. V. M. A.

THE BRINGING together at an annual meeting of the interwoven yet geographically separated interests of a national group; the mingling of the personalities that represent that group; the reviewing and correlating of the activities of the year just past; and the founding of the projects for the year ahead—these, in brief, are the motivating characters of an annual convention.

When our national group meets at the Hotel Peabody in Memphis on August 28, we are undoubtedly going to have "plenty to talk about." There have been many significant changes, many advancements, not only within the sphere of our own association but within the profession as a unit. In the course of the program, we shall survey what men in research have done. Practitioners will tell of their experiences. Representatives of the veterinary colleges will relate the current plans of the educational system. The exhibitors will have an interesting story to tell, too. Their displays will reveal the indispensable assistance and valuable services which they provide.

This panorama of instructive achievement, staged in an atmosphere of cordiality and good fellowship, affords to every one in attendance the finest means available for participating in the progress and planning of veterinary medicine.

The 76th annual meeting will be of equal interest to the newcomers of the profession. Recent graduates who are about to enter their freshman year in the field will gain a wealth of information through attending this five-day event. Here they will have an opportunity to meet and converse with the leaders of the profession, to talk over with informed persons their plans for the future, and to gain advice on their problems.

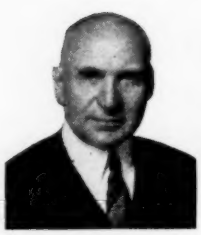
It should not be forgotten that the annual convention includes also a meeting of the Women's Auxiliary, whose members have contributed immeasurably to the welfare of the veterinary profession.

On behalf of the officers and the committees responsible for the organization of the program, a cordial invitation is extended to all members of the profession and their wives to join us in Memphis, August 28 to September 1. This seventy-sixth in our series of annual gatherings promises to be one you will long remember.

Sincerely,

H. D. Bergman, President

Executive Board, American



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10th District

*Upon assuming the position of executive secretary, L. A. Merillat resigned as member of the Board for District 3. On June 19, President Bergman appointed Herbert Lothe to fill this vacancy. Dr. Lothe accepted the appointment on June 21. Unfortunately, his portrait was not received in time to be included in this group.

Veterinary Medical Association

ALTHOUGH the Executive Board is the administrative council and its chairman the chief executive of the Association, too few of the 5,000 and more comprising the membership have a clear understanding of its makeup and task.

The indifference is, however, comprehensible. The newness of things in organized veterinary medicine is not the entire answer. The main fault has been a failing to keep a clear tableau of the Association's official setup and acts constantly and faithfully before the membership through its publications and its numerous contacts with state, regional and local organizations.

Knowledge of its operations has continued to be vague and sketchy through the years to the unfortunate extent that members (well meaning but uninformed) have been propagating the idea that their council of leaders is of little consequence—as a prominent member once said erroneously, "a board of politicians who meet twice a year at the expense of their electors without taking the trouble to publish a report of what they do." As the latter part of the charge is true, the fault has been not in what the Board has or has not done, but in failing to tell the story of its work in the JOURNAL in order to enlighten, and keep up interest among, those who pay the bills. Silence, modesty and the absence of close supervision over the Association's affairs are accountable for the vicious circle that has kept this indefatigable council from being awarded the credit it has earned.

All of this was corrected when the Association (1937) delegated executive authority, unrestricted, to a reorganizing committee, charged it with the duty of exercising a close supervision over the Association's affairs, and insisted that the committee's orders be obeyed. From that day, the Association began to take command of its responsibilities and to see that its plans are carried out to the letter. In other words, the Executive Board through its reorganizing committee established a workable connection with the membership by reforming the operations of the central office, of which changes in personnel were but a minor part of the revised program.

The *laissez faire* situation at the central office which stood between the Board's recommendations and the membership's desires was superseded by a studied discipline already expressed in the enlarging membership and increasing influence. Colloquially stated, the A. V. M. A. has begun to go places, thanks to the courageous actions of the Executive Board's reorganizing committee, whose journeys to Chicago from time to time during the past two years have not been in vain. The reforms include definite changes in accounting, advertising, purchasing, filing, editing, printing, correspondence, handling of manuscripts, relations with associate editors, section officers, committees, state secretaries, member associations, Women's Auxiliary, student chapters, and the installment of modern methods and equipment, not to mention the multiple details these changes include. So, in celebrating the 76th anniversary, the veterinary profession can be reassured that it does have a duteous executive council planning for the future.

The Board, whose portraits we reproduce herewith, is the successor of the former Executive Committee which superseded the Comitia Minora of the forefathers. Under these names it has been a going council for 76 years and is entitled to credit for what we are and what we have gained in the world of science. Criticisms of its work were never well taken; as stated above, they have cropped out through neglecting to tell the story of its labors in printed words. It has trekked over rough and rugged roads and has never taken a step backward or in the wrong direction. Today, it is strictly democratic. The members elect ten of them in home territory and one at an annual meeting. To these eleven are added the president and president-elect by virtue of their offices.

This council of 13 meets twice a year; once at the annual meeting and once in Chicago in December. Being an Illinois corporation, the latter meeting is required to comply with the laws of that state. In the interest of economy, however, the Illinois (December) meeting will hereafter be limited to principal officers of the Board—the chairman of the Board, the president and the president-elect. Except for the latter two, the term of office is five years. The ten district members are chosen by mail ballots distributed to the members of the district four months before the expiration of the incumbent's term. The president is authorized to fill vacancies by appointment. Except in minor matters of administration, the actions of the Board must be approved by the House of Representatives.

Below is the constitutional apportionment of the Association's jurisdiction for Executive Board representation. The intention is to divide the territory in such a way as to give each of the ten districts approximately an equal number of eligible veterinarians.

District 1 (Alberta, British Columbia, Manitoba, New Brunswick, Nova Scotia, Ontario, Prince Edward Island, Quebec, and Saskatchewan)—A. E. Cameron, Ottawa, Ont. Term expires 1942.

District 2 (Delaware, New Jersey, and Pennsylvania)—J. G. Hardenbergh, Plainsboro, N. J. Term expires 1943.

District 3 (Illinois, Indiana, and Wisconsin)—Herbert Lothe, Waukesha, Wis. Term expires 1943.

District 4 (Alabama, Argentina, Bahamas, Bermuda, Chile, Cuba, District of Columbia, Dominican Republic, Ecuador, Florida, Georgia, Jamaica, Kentucky, Maryland, Mississippi, North Carolina, Peru, Puerto Rico, Saint Kitts, South Carolina, Tennessee, Venezuela, Virginia, and West Virginia)—William Moore, Raleigh, N. C. Term expires 1939.

District 5 (Iowa and Minnesota)—H. C. H. Kernkamp, Saint Paul, Minn. Term expires 1940.

District 6 (Arizona, California, Canal Zone, Colorado, Mexico, Nevada, New Mexico, and Utah)—I. E. Newson, Fort Collins, Colo. Term expires 1941.

District 7 (Alaska, Hawaii, Idaho, Montana, Nebraska, North Dakota, Oregon, Philippine Islands, South Dakota, Washington, and Wyoming)—W. A. Sullivan, Cheyenne, Wyo. Term expires 1940.

District 8 (Arkansas, Kansas, Louisiana, Missouri, Oklahoma, and Texas)—L. J. Allen, Oklahoma City, Okla. Term expires 1941.

District 9 (Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont)—H. W. Jakeman, Boston, Mass. Term expires 1942.

District 10 (Michigan and Ohio)—F. A. Zimmer, Pataskala, Ohio. Term expires 1939.

This Is How the Ladies Looked in 1910

The group shown above attended the A.V.M.A. convention at San Francisco, Calif., in September of 1910.

Committee on Local Arrangements

MEMBERS of the Committee on Local Arrangements have been holding regular monthly meetings at the Hotel Peabody in Memphis to plan and organize all of the activities of the five-day meeting. Without exception, they have been enthusiastic and conscientious workers.

It is no small task to align the many and varied features of a national convention and to assemble them into a compact, smooth-functioning organization. This is precisely what they have accomplished, and for their fine work in bringing to completion the programs of entertainment, special features, exhibits, and the various clinics, and the dissemination of the news of their activities, a rising vote of congratulation is certainly due. These men and their respective rôles are:

John H. Gillmann, *Chairman*, Memphis, Tenn.

J. W. Scheibler, *Vice-Chairman*, Memphis, Tenn.

C. L. Allen, *Secretary*, Memphis, Tenn.

Andy Crawford, *Alumni Dinners*, Rolling Fork, Miss.

C. D. Stubbs, *Banquet, Reception and Dance*, Little Rock, Ark.

E. S. Brashier, *Entertainment*, Jackson, Miss.

G. E. Mitchell, *Educational Exhibits*, Memphis, Tenn.

H. H. Carter, *Technical Exhibits*, Memphis, Tenn.

J. T. Alston, *Cattle Clinic*, Tupelo, Miss.

W. L. Gates, *Horse and Mule Clinic*, Clarksdale, Miss.

E. B. Mount, *Small Animal Clinic*, Memphis, Tenn.

C. P. Branigan, *Swine and Poultry Clinic*, Memphis, Tenn.

W. L. Stroup, *Restraint of Large Animals*, Corinth, Miss.

J. L. Arnandez, *Publicity*, Memphis, Tenn.

These Ladies Will Entertain You August 28 to September 1

Introducing—front row, left to right: James Mitchell, Dick Patterson, Martha Lorine Lumpkin, and Jo Anne Crawford. Second row: Mrs. F. C. Harris, Memphis, Tenn.; Mrs. W. L. Stroup, Corinth, Miss.; Miss Peggy Harrell, Blytheville, Ark.; Mrs. John S Bixby, Memphis; Mrs. John H. Gillmann, Memphis Mrs. J. L. Wright, Memphis; Mrs. C. L. Allen, Memphis; and Mrs. J. C. Smith, Stuttgart, Ark. Back row: Mrs. J. L. Arnandez, Memphis; Mrs. G. E. Mitchell, Memphis; Mrs. Andy Crawford, Rolling Fork Miss.; Mrs. E. B. Mount, Memphis; Mrs. Otis Harbour, Memphis; and Mrs. E. S. Brashier, Jackson. Miss.

LITERARY PROGRAM

Because of the rather early date, several of the presentations on both the literary and the clinical program are subject to change. Additions and alterations undoubtedly will be necessary before the official program is published and mailed.

Section on Research

Chairman: H. H. Dukes
Cornell University, Ithaca, N. Y.

Secretary: Frank Thorp, Jr.
Colorado State College, Fort Collins, Colo.

Lesions of Gossypol Poisoning in Dogs Fed Cottonseed Meal—John L. West, animal pathologist, Alabama Polytechnic Institute, Auburn, Ala.

Streptococcic Infections in Dogs. II. Pathogenicity for Pups, Abscesses, Tonsilitis, and Acid Milk—H. J. Stafseth, professor of pathogenic bacteriology, Michigan State College, East Lansing, Mich.

Studies in Canine Coccidiosis—F. X. Gassner, assistant professor of physiology, Colorado State College, Fort Collins, Colo.

A Systematic Survey of the Gastrointestinal Worm Parasitisms of Cattle—D. W. Baker, assistant professor of parasitology, Cornell University, Ithaca, N. Y.

The Susceptibility of Guinea Pigs to Equine Encephalomyelitis Virus Inoculated Through Various Routes—Carl F. Schlotthauer, associate professor in veterinary medicine, The Mayo Foundation, Rochester, Minn.

Influence of Various Ions on Intestinal Motility—E. A. Hewitt, associate professor of veterinary physiology, Iowa State College, Ames, Iowa.

A Study of Death Losses in New-Born Pigs—L. P. Doyle, associate pathologist, Indiana Agricultural Experiment Station, Lafayette, Ind.

A Bacteriological Study of the Aerobic Flora of Pneumonic Lungs in Swine—Frank Thorp, Jr., associate pathologist, Colorado Experiment Station, Fort Collins, Colo., and F. W. Tanner, professor of bacteriology, University of Illinois, Urbana, Ill.

The Blood Picture of Hog Cholera—H. C. H. Kernkamp, associate professor of veterinary medicine, University of Minnesota, Saint Paul, Minn.

Variable Factors in the Measurement of Red-Cell Sedimentation—R. E. Nichols, instructor in veterinary surgery, Ohio State University, Columbus, Ohio.

The Chemistry of Horse Blood with Special Reference to Bone Lesions and Deformities—A. Henry Craige, Jr., assistant instructor in physiology, University of Pennsylvania, Philadelphia, Pa., and John D. Gadd, general practitioner, Towson Veterinary Hospital, Towson, Md.

The Behavior of Brucella Vaccine in Various Excipients in Animal Inoculations—A. Eichhorn, director of the Animal Disease Station, C. K. Mingle, junior veterinarian, and F. M. Murdock, junior veterinarian, Animal Disease Station, Bureau of Animal Industry, U. S. Department of Agriculture, Beltsville, Md.

Incubating Hen's Egg as a Culture Medium for *Brucella Abortus*—H. J. Metzger, animal physiologist, Agricultural Experiment Station, New Brunswick, N. J.

The Vaccination of Dogs with Modified Distemper Viruses—R. G. Green, professor of bacteriology, University of Minnesota, Minneapolis, Minn., and F. S. Swale, Fromm Laboratories, Grafton, Wis.

Section on Sanitary Science and Food Hygiene

Chairman: Milton R. Fisher
City Health Department, Saint Louis, Mo.

Secretary: M. B. Starnes
City Health Department, Dallas, Texas.

Some Present Trends in Milk Sanitation—Franklin A. Clark, milk specialist, U. S. Public Health Service, Washington, D. C.

The Laboratory Diagnosis of Rabies: Improved Methods—Joseph C. Willett, chief of laboratories, Department of Welfare, Health Division, Saint Louis, Mo.

Some Observations on Undulant Fever Epidemic at Michigan State College—I. Forest Huddleson, department of bacteriology and hygiene, Michigan State College, East Lansing, Mich.

Bang's Disease and Its Control in the Dairy Herd—W. E. Cotton, professor of veterinary medicine, Alabama Polytechnic Institute, Auburn, Ala.

New Phases of Milk-Control Work—M. O. Robinson, professor of bacteriology, Alabama Polytechnic Institute, Auburn, Ala.

Trichinosis and Its Control—L. E. Starr, professor of parasitology, Alabama Polytechnic Institute, Auburn, Ala.

A Thorough Understanding Between Milk Producer, Inspector and Laboratory Technician—Frank E. Kitchen, dairy and abattoir supervisor, Department of Health, Greenville, S. C.

Section on General Practice

Chairman: James Farquharson
Colorado State College, Fort Collins, Colo.

Secretary: W. T. Oglesby
Louisiana State University, University, La.

Lameness Incident to Training and Racing—J. E. Peters, San Mateo, Calif.

Diseases Incident to Fattening of Lambs—N. J. Miller, Eaton, Colo.

Mineral Deficiencies: Clinical Picture, Treatment and Prevention — Hubert Schmidt, College Station, Texas.

So-Called Hemorrhagic Septicemia—W. A. Aitken, Merrill, Iowa.

Anesthetics Applicable to Large Animals—Geo. R. Fowler, Division of Veterinary Medicine, Department of Surgery, Iowa State College, Ames, Iowa.

Nonspecific Enteritis of Swine—F. M. Wilson, Mechanicsville, Iowa.

Swamp Fever—W. L. Gates, Clarksdale, Miss.

Mule Practice in the Sugar-Cane Belt—J. A. Goodwin, New Iberia, La.

Pneumonia in the Horse—D. L. Proctor, Lexington, Ky.

Intravenous Medication — W. R. Krill, Veterinary Clinic, Ohio State University, Columbus, Ohio.

Diseases of New-Born Calves—Fred Miller, Whitewater, Wis.

Diseases in Feeder Cattle—W. S. O'Neal, Saint Charles, Mo.

Controlling Diseases and Parasites in Garbage-Fed Hogs—P. C. Guyselman, San Bernardino, Calif.

You'll See Them Picking Cotton, August 28 to September 1

This is a scene on the Wilson plantation in Wilson, Ark.—across the Mississippi from Memphis. A half-day outing and barbecue is to be staged on this site, with native negro singers furnishing the entertainment for Association conventioners.

Section on Small Animal Practice

Chairman: Gerry B. Schnelle
Boston, Mass.

Secretary: C. P. Zepp
New York, N. Y.

The Hematology of Avitaminosis A in the Dog—M. W. Emmel, Agricultural Experiment Station, University of Florida, Gainesville, Fla.

A Mouse Test for Measuring the Immunizing Potency of Canine Antirabies Vaccines—L. T. Webster, Rockefeller Institute for Medical Research, New York, N. Y.

The Use of Vitamins and Vitamin Preparations in Small Animal Practice—M. L. Morris, Raritan Hospital, New Brunswick, N. J., and W. C. Russell, Department of Agricultural Bio-Chemistry, Agricultural Experiment Station, Rutgers University, New Brunswick, N. J.

Blood Parasites of the Dog—R. L. Mundhenk, Alabama Polytechnic Institute, Auburn, Ala., and J. E. Greene, Auburn, Ala.

Enteritis in Dogs and Some of Its Complications—Leonard W. Goss, Ohio State University, Columbus, Ohio.

Tumors of Small Animals—Peter Olafson, New York State Veterinary College, Ithaca, N. Y.

Common Diseases of the Eye and Their Treatment—R. O. Rychener, human eye specialist, Memphis, Tenn.

Improved Surgery Technic—C. P. Zepp, New York, N. Y.

Section on Poultry

Chairman: F. D. Patterson
Cuthbert, Ga.

Secretary: E. P. Johnson
Virginia Polytechnic Institute,
Blacksburg, Va.

The Relationship of Ruptured Yolks to Fowl Paralysis—E. M. Moore, Morgantown, W. Va.

Duck Septicemia—C. S. Gibbs, Pearl River, N. Y.

The Enforcement of the Food and Drugs Act in Misbranded Poultry Remedies—H. E. Moskey, Washington, D. C.

Fowl Typhoid in Turkey Poults—E. P. Johnson and Morris Pollard, Virginia Polytechnic Institute, Blacksburg, Va.

Pseudo-Tuberculosis Infection in the Blackbird—F. R. Beaudette, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

What the Practicing Veterinarian Should Do to Develop Poultry Practice—J. L. West, Alabama Polytechnic Institute, Auburn, Ala.

Section on Research and Section on Poultry

(Combined Session)

An Attempt to Produce Preparturient Paresis in Ewes—Hugh S. Cameron, Division of Veterinary Science, University Farm, Davis, Calif., and H. Goss, associate professor of animal husbandry (and associate animal husbandman in the California Agricultural Experiment Station), University of California, Davis, Calif.

Studies on the Total Ketone Bodies, Sugar and Calcium in the Blood of Nonpregnant Ewes—Jesse Sampson, L. E. Boley, and Robert Graham, University of Illinois, Urbana, Ill.

A Study of the Composition of the Alveolar Air of Domestic Animals—George T. Edds, A. & M. College of Texas, College Station, Texas.

Indoor Hen-Battery Mortality—M. W. Emmel, Agricultural Experiment Station, University of Florida, Gainesville, Fla.

Studies on Pullet and Hen Mortality—L. E. Boley and Robert Graham, University of Illinois, Urbana, Ill.

The Incidence and Classification of Avian Tumors—L. J. Goss, University of Kentucky, Lexington, Ky.

General Sessions

Equine Encephalomyelitis—H. W. Schoening, Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C.

Importance of the Veterinary Service in This Country—D. M. Campbell, editor of

(*Continued on page 9*)

CLINICAL PROGRAM

Horse and Mule Clinic

Chairman: W. L. Gates
Clarksdale, Miss.

Operation: Roarer—T. A. Sigler, Greencastle, Ind.

Operation: Trephine and Punch Tooth with Nerve Blocking—E. R. Frank, Kansas State College, Manhattan, Kan.

Operation: Monorchid Castration—E. E. Wegner, State College of Washington, Pullman, Wash.

Demonstration: Pregnancy Test—Charles E. Salsbery, Kansas City, Mo.

Operation: Hyovertebrotomy—W. A. Barnette, Greenwood, S. C.

Discussion: Skin Diseases of Large Animals—John D. Beck, University of Pennsylvania, Philadelphia, Pa.

Dental Operations—E. E. Wegner, State College of Washington, Pullman, Wash.

Discussion: Diseases of the Eyes of Horses—W. Graham Love, University of Pennsylvania, Philadelphia, Pa.

Operation: Fistulous Withers—W. A. Aitken, Merrill, Iowa.

Operation: Firing—D. L. Proctor, Lexington, Ky.

Operation: Quittor—George R. Fowler, Iowa State College, Ames, Iowa.

Demonstration: Nerve Blocking—James Farquharson, Colorado State College, Fort Collins, Colo.

Demonstration: Sterility and Artificial Insemination—Frank Hare, Lexington, Ky.

Operation: Enucleation of the Eye—George R. Fowler, Iowa State College, Ames, Iowa.

(Continued from page 8)

Veterinary Medicine, Chicago, Ill.

Some Nervous Disturbances Due to Avitaminosis B_1—John W. Patton, East Lansing, Mich.

Effect of Heat on Phenolized Virus and Virulence of Hog Cholera—J. D. Ray, Omaha, Neb.

Operation: Roarer—J. L. Hopping, Atlanta, Ga.

Operation: Surgical Method of Handling Collapsed Trachea—I. S. McAdory, Alabama Polytechnic Institute, Auburn, Ala.

Operation: Drainage of Navicular Bursa—F. M. Wilson, Mechanicsville, Iowa.

Operation: Crib Biting—W. A. Barnette, Greenwood, S. C.

Cattle Clinic

Chairman: J. T. Alston
Tupelo, Miss.

Demonstration: Sterility—W. A. Hornaday, Greensboro, S. C.

Demonstration: Diagnosis of Mastitis—M. M. Leonard, Asheville, N. C.

Demonstration: Collection of Semen and Artificial Insemination—John V. Nevitt, Cape Girardeau, Mo.

Spaying of Heifers—J. K. Northway, Kingsville, Texas.

Miscellaneous Cattle Operations—S. L. Stewart, Olathe, Kan.

Operation for Self-Sucking—L. E. Starr, Alabama Polytechnic Institute, Auburn, Ala.

Milk Fistula—J. T. Alston, Tupelo, Miss.

Sheep, Swine and Poultry Clinic

Chairman: C. P. Branigan
Memphis, Tenn.

Demonstration: Hog Cholera—John S. Koen, Storm Lake, Iowa.

Demonstration: Swine Erysipelas—O. B. Neely, Union City, Tenn.

Demonstration: Sheep—E. W. Price, Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C.

Caesarian Operation (Swine)—R. A. Gathman, Franklin, Tenn.

Demonstration: Coccidiosis in Poultry—Cliff D. Carpenter, Fort Wayne, Ind.

Demonstration: Tuberculosis in Poultry—A. J. Durant, University of Missouri, Columbia, Mo.

Demonstration: Laryngotracheitis in Poultry—G. S. Harshfield, Colorado State College, Fort Collins, Colo.

Small Animal Clinic

Chairman: E. B. Mount
Memphis, Tenn.

Demonstration: Various Anesthetics—R. L. Anderes, Kansas City, Mo., and J. A. Bogue, Wichita, Kan.

Demonstration: Various Applications of Splints; Operation: Luxation of Patella—Ellis P. Leonard, Summit, N. J.

Tonsilectomy—A. V. Young, Shreveport, La.

Operation: Hypertrophy of Prostate, and Ossa Bulla—A. A. Herman, Denver, Colo.

Operation: Glaucoma—Mason Weadon, Washington, D. C.

Demonstration: Endoscopy, Bronchoscopy, and Gastroscopy—J. Gilbert Horning, Houston, Texas.

Blackboard Demonstration: Side to Side Anastomosis; Large Hernia Operation by Grafting Skin; Nerve and Tendon Operation—C. P. Zepp, New York, N. Y.

Castration by One-Stitch Method—J. L. Ruble, Orlando, Fla.

Corneal Transplant—J. Wesley McKinney, Memphis, Tenn.

Restraint of Large Animals

Chairman: W. L. Stroup
Corinth, Miss.

Actual Restraint—M. J. Rattray, Jr., Anderson, S. C.; Sam Dorfman, Auburn, Ala.; Vick Weisberg, Europa, Miss.; Mack Rachman, Booneville, Miss.; W. L. Pinckard, Elizabethtown, Tenn.

Anesthetic: Local and General—E. R. Frank, Kansas State College, Manhattan, Kan.; M. Jacob, Knoxville, Tenn.; A. C. Topmiller, Nashville, Tenn.; J. I. Siress, assistant state veterinarian, Cleveland, Tenn.; L. D. Nowell, assistant state veterinarian, Humboldt, Tenn.; Walter Martin, Jonesboro, Ark.; R. A. Gathman, Franklin, Tenn.; F. P. Woolf, Alabama Polytechnic Institute, Auburn, Ala.; J. L. Hopping, Atlanta, Ga.; M. R. Blackstock, Spartanburg, S. C.; Wm. H. Ivens, Ardmore, Pa.; C. L. Proctor, Lexington, Ky.; M. A. Emmerson, University of Pennsylvania, Philadelphia, Pa.; and I. S. McAdory, Alabama Polytechnic Institute, Auburn, Ala.

The South Is Justly Proud of Cattle Like These

A herd of cattle on the Wilson plantation in Wilson, Ark.

EXHIBITORS

Much time, effort and investment have been expended by the coöperating firms to create and produce the scientific exhibits which will be on review at the 76th annual meeting. Each of these exhibits is educational and colorful. As a group, they tell in a pictorial way the progress that can be made where a spirit of coöperation exists.

Abbott Laboratories

Abbott Laboratories will have on display at their exhibit: Nembutal and Pentothal, two popular barbiturates for surgical anesthesia in animals; Vita-King, a well balanced vitamin supplement; western strain equine encephalomyelitis vaccine (chick); Metaphen, the well known organic mercurial; and other Abbott products widely used by the veterinary profession.

Archer-Daniels-Midland Company

The Archer-Daniels-Midland Company, long-time producers of oils pressed from cereal grains, will exhibit wheat germ oil of the cold-pressed type, distribute scientific literature on the therapeutic use of the vitamin E complex, and demonstrate the Shute Test for vitamin E deficiency.

Associated Serum Producers

The many educational activities being carried on by the Associated Serum Producers in the interests of the veterinary profession and the live stock industry will be featured in a comprehensive exhibit.

Included in the exhibit will be clippings from the thousands of newspapers which are carrying news releases issued by the organization through their bureau, The American Foundation for Animal Health.

Becton, Dickinson & Co.

The B-D exhibit at the meeting will consist of thermometers—metal and glass, all-glass and all-metal syringes, needles, bandages (all cotton elastic, without rubber and washable), and other items, such as milking tubes, in which the new Bowen type will be featured, intravenous injectors, dose syringes, and adapters.

Corn Belt Serum Company

The display of the Corn Belt Serum Company will consist of a booth composed of eight shelves. The products to be featured on each shelf are as follows: anti-serums, virus; bacterins, vaccines; antitoxins, toxoids; diagnostic agents; azamine products; pharmaceuticals; specialties; and surgical supplies.

The Corn States Serum Company

The various products handled by The Corn States Serum Company will be on display at their booth in the convention headquarters. Particular attention is invited to the Grogan Kennel, which is the last word in kennel construction and features the sanitary shield above a removable base pan.

Curts-Folse Laboratories

The booth of the Curts-Folse Laboratories will be groomed with a background of replicas of the firm's labels. On a table in front will be displayed some label packages of their outstanding products.

Cutter Laboratories

The Cutter Laboratories will display various biological products and allied specialties. The main feature of the display, however, will be colored motion pictures of hog cholera immunization field work with Boynton's tissue vaccine (BTV). These films show immunization demonstrations carried on since February 1, 1939, at various farms in Illinois and Missouri, and were made with the permission of the state veterinarians and the bureau of animal industry.

Doho Chemical Corporation

The Doho Chemical Corporation will exhibit colored slides showing diseases of the ear in pets. It will be shown how Aurulgan relieves otorrhea, controls canker, and erad-

icates ear mites after the removal of foreign bodies, wax or water.

EISELE & COMPANY

Eisele & Company will exhibit its regular line of clinical thermometers, hypodermic syringes, and needles with the new needle locking device. Other items on display will be a new material for making small animal splints, the No-Air milking tube, and improved animal dosing syringes. A new development will be shown in the ground plunger all-glass type of syringes with catheter tips. Fleece-lined elastic bandages without rubber, for use on race horses, also will be featured.

This Is the South's Best Live Stock Market

An airplane view of the South Memphis stockyards.

H. G. FISCHER & CO.

Visitors to the H. G. Fischer & Co. exhibit will have an opportunity to investigate the firm's latest models of shockproof x-ray apparatus and short wave diathermy equipment. The unique features of these 1939 Fischer models will be pointed out.

GENERAL ELECTRIC X-RAY CORPORATION

The exhibit of the General Electric X-Ray Corporation will include their Model F-3-35 unit for veterinary x-ray, which has won the almost universal acceptance of the profession. In addition there will be a very interesting display of radiographs. A combination handbook and catalog showing the uses of modern x-ray and electro-medical apparatus in veterinary practice will be given to visitors.

FORT DODGE LABORATORIES, INC.

The Fort Dodge exhibit at the meeting will consist of an attractive exposition of all the newest and best developments in veterinary pharmaceutical and biological products. Every care is being taken to make this one of the most worth while exhibits of its kind.

HAVER-GLOVER LABORATORIES

The Haver-Glover Laboratories will display their general line of veterinary supplies—biological, pharmaceutical, and surgical products. Many of the newer listings in the 1939 edition of the Haver-Glover *Manual* will be featured for the first time.

HILL PACKING COMPANY

The Hill Packing Company, manufacturers of Hill's Dog Food, will display an illuminated "seal of approval" of the American Animal Hospital Association in connection with the showing of their product.

An educational exhibit of interest not only to members of the A.A.H.A. but to all small animal practitioners will be given

prominence. Veterinarians will have an opportunity to examine the ingredients contained in the Hill product.

LEDERLE LABORATORIES

Lederle Laboratories will feature in their booth the only field-proven encephalomyelitis chick vaccine available, also their new and improved encephalomyelitis serum for treatment.

Calcium Hibate Refined, a new calcium solution, will be included in the display of the firm's many new preparations serving as valuable allies of the veterinary profession.

ASHE LOCKHART, INC.

The exhibit of Ashe Lockhart, Inc., will include the various biological products manufactured by the firm and some pathological material, to be exhibited both as macroscopic and microscopic specimens.

NORDEN LABORATORIES

The Norden Bolet, a specialty which is a "cross between a tablet and a bolus," will be one of the featured pharmaceuticals in the Norden Laboratories' display. The non-precipitating Norcalcinate solutions also will be shown, as well as their Certified Brand pharmaceuticals, biological products, and instruments (identified by their trademark, the Viking ship). Certified Brand symbiotically grown, chemically killed, and guinea-pig-tested bacterins and triple-tested anti-hog cholera serum will be prominent.

JENSEN-SALSBERY LABORATORIES

Jensen-Salsbery Laboratories will offer a complete display of surgical instruments in the improved patterns. For their pharmaceutical exhibit, they will feature Stibsol, a new antimony compound for the treatment of heartworm in the dog. This product has been developed through three years of research in the Jen-Sal laboratories. Halatal, a relatively new barbiturate solution for use in small animal practice, also will be featured. The firm's regular line of biological products also will be on display.

MERCK & CO.

Follicular mange of the dog and its treatment with Canex will play an important rôle in the exhibit of Merck & Co. Photographs of affected animals, technic of laboratory diagnosis, a histological section of an infested hair follicle, and data on age incidence will be presented.

Plantation Roof of the Peabody Hotel

The Peabody Hotel in Memphis will be the headquarters of the convention. This famous establishment is known for its fine service and hospitality. Like the other hotels of Memphis, its rates are reasonable and are never inflated on the occasion of a convention.

Lentin, a parasympathetic stimulant, will be displayed in the new 20-cc. rubber-stoppered vial. There will be a few pictures showing experimentally produced deficiencies of the water-soluble vitamins, particularly vitamin B_1, riboflavin, nicotinic acid, and vitamin B_6.

THE NORTH AMERICAN VETERINARIAN

The *North American Veterinarian* will devote its booth to welcoming the many friends and readers of that journal. The exhibit is to be primarily a goodwill enterprise that undoubtedly will benefit mutually the readers and publishers.

ALLIED LABORATORIES, INC., AND PITMAN-MOORE COMPANY

Allied Laboratories, Inc., and the Pitman-Moore Company will occupy adjoining booths, where several of their officers and representatives will be in attendance. The exhibit will feature the new laboratory buildings recently constructed at their Indianapolis, Ind., pharmaceutical laboratories and their biological laboratories near Zionsville, Ind. The newest additions to the firm's lines of veterinary pharmaceutical and biological products will be displayed.

Representatives will explain the recent building program which has been inaugurated, at completion to result in more than doubling the production capacity of the two plants.

SHARP & DOHME

The Sharp & Dohme display will include Mulford biological products and pharmaceutical specialties of particular interest to veterinarians. Among these products will be shown, for the first time, the new Lyovac biological products—a quite revolutionary advancement. Under this new process, biological products retain their therapeutic efficiency far beyond the expiration dates of the liquid forms. Freezing at subzero temperature with rapid dehydration under vacuum, and maintenance of this vacuum in the finished package, are features of this new process.

R. J. STRASENBURGH CO.

The R. J. Strasenburgh Co. will exhibit some of their new products for the first time. Visitors at the booth will view one of the latest models of the Strasco canine operating tables. Strasenburgh products (pharmaceuticals, equipment, surgical instruments, and supplies) are available in the district surrounding Memphis through their distributors in that section, the Southern Bio-Chemical Company of Memphis.

SWIFT & COMPANY

Pard, Swift's dog food, will be featured in a novelty booth that should be highly entertaining and educational. Swift & Company again tells the story of its laboratory work, points out that generation after generation of fine dogs have been raised exclusively on Pard. Their exhibit promises to be an outstanding attraction among the displays.

WILSON & CO.

Wilson & Co., the manufacturers of Ideal Dog Food, will feature a display emphasizing the selection of pure, nutritious ingredients, and the latest developments of the nutritional work by the Wilson & Co. fellowship at a leading midwestern university.

WINTHROP CHEMICAL COMPANY, INC.

The Winthrop Chemical Company, Inc., will display its original synthetic pharmaceutical products for veterinary use. Among them are: Neoprontosil solution and tablets, outstanding contributions in the field of chemotherapy; Omnadin, the lipoid-protein combination for nonspecific therapy; Betaxin, the first synthetic crystaline vitamin B_1; and Zephiran, an antiseptic with high germicidal potency.

Representatives will be in attendance to supply literature and answer questions regarding any of their specialties.

The Judy Publishing Company, entrepreneur of *Dog World* and other publications of interest to veterinarians, and the Veterinary Magazine Corporation, publishers of *Veterinary Medicine*, will also be on hand to greet their many friends and readers.

The Rôle of Veterinary Service in Modern Warfare*

By ORVILLE E. McKIM, V. S.
Port Chester, N. Y.

THE NEXT great war will undoubtedly be decided, as was the World War, upon one factor—which side has the most efficient animal transport. This prediction is amply substantiated by the statement of the late Earl Haig, who, as field marshal of the British forces in France, said: "If in March of 1918 the equine forces of Germany had been on the same scale and as efficient as the British equine force, the Germans would unquestionably have succeeded in breaking through between the French and British armies and inflicted a defeat so great that a recovery might have been impossible." The introductory prediction is also substantiated by Ludendorf, who in his memoirs lamented the fact that Germany was so poorly supplied with horses. Captured German papers also disclosed the vital need for horses by the German army, as they revealed orders to "secure as many British horses as possible." One of the most tragic scenes witnessed in the World War was the retreat of the remnants of the much heralded Grand German Army, which was using mixed teams of oxen and horses in a vain endeavor to salvage the transport and artillery.

The words of the Roman comic poet, Plautus, are particularly applicable to this discussion: "That man is wise to some purpose who gains his wisdom at the expense and from the experience of another." Of particular significance also is the observation of Burke: "Example is the school of mankind, and they will learn at no other."

The enthusiastic and impetuous desire of the present-day military strategists to place their reliance on completely mechanized forces has been found to be ill-advised through actual war trials in Ethiopia, Spain and China.

In a previous article by the writer[1] attention was called to the experience of the supposedly invincible mechanized Italian army in Ethiopia. According to Major Fiske's report,[2] 70,000 mules were finally used in transporting almost all division artillery when mechanization was proved to be useless in that terrain. It is quite clear what would have happened to that army if it had encountered an enemy with effective artillery or air defense. According to Associated Press dispatches, 10,000 camels also were purchased from Syria for use in Ethiopian lowlands. That mechanization was futile in the armies engaged in the Spanish civil war has recently been exposed in a résumé of pertinent facts.[3] The general conclusion to be drawn from the entire Spanish campaign is that the new mechanized weapons give the attacker no more advantage than he had in the World War—and that was not enough.

Franco did wonders in his march from Seville to Madrid with his modern army having motorized transport, but when his untrained opponents were able to take prepared positions, the drive collapsed. When the Italian forces in Spain attempted a mechanized attack along the ground, an even greater failure resulted. A force of 30,000 with tanks and armored cars moved swiftly along the roads toward the instantaneous success of the Fascist theory. When government troops and artillery moved out at Guadalajara to meet this force and deployed from the main road to fight, immediately the motility of the attacking forces vanished. Their mechanized vehicles became entangled with each other in the mud, presenting targets rather than an attacking army. When an attempt at retreat was made, the roads choked, and pilots flying overhead slaughtered the motorized army almost as they pleased.

A verbal description of that rout was recently given by Capt. Derek D. Dickinson to those in attendance at the March conference of the medical section, Line and

*Presented at the Medico-Military symposium, 2nd Corps Area, April 18, 1939.

Staff School at Whitehall Street. No one—German, French, Italian or Russian—is happy about tank performance in Spain. The light tanks are not safe against steep-sided ditches, hand grenades in the treads, or flaming gasoline. An interesting, if not to say embarrassing, experience was the occurrence recently in the British and French armies on maneuvers when they ran out of gasoline.

The more recent experience of the mechanized forces of Japan in the invasion of China provides plenty of stimulation for good, sober thought. The Japanese staff planned on taking Shanghai in two weeks, but 88 days had elapsed before this objective was achieved, and then after animal transport was brought in to carry on from the point where mechanization stalled. The conclusions drawn by corps and army commanders in recent United States Army maneuvers are agreed that the horse continues to be the best means of transportation and reconnaissance on or near the actual battlefield. It is refreshing to learn that the general staff of the United States Army recently decided that mechanized equipment could be considered only in the light of an auxiliary to the foot soldier, upon whom, in the final analysis, falls the real brunt of the war.

The medical corps charged with the evacuation of the wounded should give careful thought to the possible use of animals at the front. Those who saw service in the combat area in the last war still hope that satisfactory methods will be devised for the evacuation of the wounded from the advanced points. Considerable improvement must be made in the available facilities if their hopes are to be realized. It is unfortunate that motorization has become so foremost in the minds of many that the possibilities that exist in animal transport have been overlooked if not relegated to the discard.

Some experimental work with animal-drawn ambulances has been done but, judging from the reports, no real progress has been made in this particular field.[4] It is believed that the four-wheel animal-drawn ambulance is obsolete and has outlived its usefulness in any terrain, and that efforts should be made to develop a method of evacuation which will fill the gap that exists between the point of injury and the nearest motor-ambulance station. Those casualties reaching the point where motor ambulances are available have at least an even chance, but the problem yet to be solved is the most efficient and rapid method of transporting those seriously wounded from the battlefield to the motor-ambulance station. Too many die because rapid evacuation is not possible by hand litters.

We have available in the United States an animal of unusual adaptability and stamina—the Missouri mule. There has also been developed in the work shop at Carlisle Barracks an ideal two-wheel cart that will carry two litter cases. It is to be hoped that instead of concentrating all efforts on complete motorization of ambulance sections, the use of animal auxiliary will be carefully considered. Through this method, the mules and carts could be transported in motor trucks to the front. Carts could be assembled and mules harnessed at that point, and efficient and prompt evacuation from the field could then be inaugurated.

It is believed that serious consideration should be given to the promulgation of a plan whereby mule-cart collection units could be created and assigned to field army headquarters. They would then be available for corps and division use when needed. These units should be equipped with mules that have been specially trained by being exposed to conditions that simulate those encountered at the front, such as machine-gun bursts, shell explosions and shell holes. The personnel of such units will also need to be trained in this type of evacuation service.

The proponents of completely mechanized forces have had conclusive demonstrations in Spain of what happens to "streamlined" armies when an enemy is encountered having adequate artillery and air strength. In China and Ethiopia sufficient proof is also available as to the effectiveness of the lowly doughboy in slowing up perceptibly the juggernaut of mechanization.

With the mass of evidence available, there is every reason to contend that in

addition to the animal transport mentioned, still another prediction is well founded, *i.e.*, the side that has the most efficient animal transport must also possess the most efficient veterinary service. A résumé of the animal strength of the allies in the World War and of the achievements of the British veterinary service is pertinent to this discussion. It will serve to inform those interested regarding the number of animals used in the War, and show by results why competent veterinary service is of great importance.

The pre-War establishment of the British army had an animal strength of 23,000. The original expeditionary forces had an animal strength of 53,000 and during the first twelve days of the War, 165,000 animals were impressed into service. From August, 1914, to June, 1918, 450,000 were bought in the United Kingdom and 700,000 were bought in the United States and Canada. In 4½ years 750,000 were used in France and 43,000 in Mesopotamia and Egypt. On all fronts there were a million in use, and the number purchased for war purposes was 1,361,000.

In August, 1914, France had 193,319 horses and her war requirement was 799,661. Up to 1917, France purchased from the United States and Spain 1,188,539.

The United States had a total of 477,262 horses, and of that number 192,000 were in France.

From the foregoing figures may be learned why efficient veterinary service is essential to the success of any army in combat. The record of the British veterinary service in the World War will stand out as a model for all future wars. From August, 1914, to April, 1919, the British veterinary service admitted to various hospitals 2,526,549 animals. Seventy-eight per cent, or 2,000,000, were cured and returned to duty. In the British expeditionary forces, under the able direction of Maj. Gen. Sir John Moore,[5] 725,216 cases were admitted and, up to the second year, 84 per cent were cured and returned to duty. This percentage dropped to 82-80 and 78 as the animals were weakened and their resistance was correspondingly lowered. The foregoing figures do not include the thousands that were treated for minor ailments under unit arrangements at the front, which were usually 2 per cent of the strength. The working procedure was that animals requiring treatment for more than seven days were evacuated to the veterinary hospitals on lines of communication. In Egypt, 447,757 horses and donkeys and 266,070 camels were treated, and 144,864 equine animals and 61,232 camels were sent to hospitals for treatment. This particular service was rendered quite difficult when it was realized that some horses were without water for 68 to 84 hours. This experience is provocative of the pertinent observation that animals "carry on" under such conditions, whereas motors would become useless.

—*From Veterinary Military History of the U. S.*

Transportation of animal casualties during the World War. Evacuation Hospital, Section 3, Third Army, Coblenz, Germany.

The responsibility and services of the veterinary corps will be noticeably increased in the next great war. The gradual replacement by motors of draft and general purpose horses in urban centers has resulted in a marked decrease in the number of horses and mules raised for the market. This will undoubtedly render it difficult to procure animals suitable for use in combat and reconnaissance service, and the replacement of casualties will present a problem of similar proportions. This will result in a complete change of the procedure followed in the World War as it affects decisions regarding the disposition of seriously wounded horses.

In the World War, if too great an amount of treatment was necessary to restore the

animal to a useful condition, it was destroyed forthwith as a potential economic loss. There was little difficulty in securing replacements, the cost of which would not equal the possible cost of treating badly wounded animals. It is safe to assume that with the anticipated scarcity of replacements existing, the foregoing plan will of necessity be altered. Regardless of cost, if animals can be restored to usefulness, they will be treated and reclaimed. Such a procedure will necessitate veterinary officers that have had considerable field experience in general practice and who possess sound judgment. The return of animals to duty undoubtedly will be of paramount importance to the cost involved.

It is possible that the formation of veterinary regiments may be the solution for the proper distribution of veterinary personnel in field armies, since all of the animal strength will be in the zone of combat, where mechanized weapons have been proved to be impractical.

The formation of veterinary regiments planned as part of the army strength would make veterinary installations readily available to the corps or division in need of them for evacuation and hospital service to protect the animals in the command. Under the present table of organization the veterinary company in the medical regiment would be misplaced, in the event that a medical regiment were assigned to a mechanized division. It is highly probable and certainly advisable that in the reorganization of the veterinary service of the field army, units will be smaller in order to render them more readily mobile, which will no doubt be necessitated by conditions in the zone of combat.

The specially trained veterinary officers will be indispensable in the protection of the health of the troops through the inspection of captured animals. Unless there be an urgent need, putting captured horses to work without first subjecting them to veterinary examination and quarantine should not be done. Glanders, infectious lymphangitis, mange and encephalomyelitis may run rampant in horses during front line action if efficient veterinary service is not available.

Captured cattle can prove to be a source of grave danger if proper quarantine and inspection are not carried out faithfully. Such dangers as tuberculosis, undulant fever and streptococcic sore throat lurk in the milk of those cows that are infected with tuberculosis, Bang's disease or infectious mastitis.

Sheep can bring any one of several communicable diseases from an enemy territory which could jeopardize the sheep-raising industry of the home lands. The prevention of the transmission of the virus of louping ill to the troops is of extreme importance in certain countries.

Hog cholera and swine plague can prove to be a grave menace to the hog-raising industry.

Equal in importance is the danger of rabies developing in captured dogs. It could prove to be a serious problem if dogs afflicted with the furious type of rabies should appear in a cantonment and attack a number of the personnel.

A recent report from Massachusetts of 14 deaths resulting from encephalitis has opened up an entirely new field for exploration in connection with this disease. The virus isolated in these cases was found to be identical with the virus that is the etiological factor of encephalomyelitis in horses.

Lt. Col. R. A. Kelser, who is now chief veterinarian in the office of the surgeon general, in 1932 completed a brilliantly conclusive research demonstrating that the mosquito is the vector of encephalomyelitis in horses. This work was subsequently corroborated by other investigators.

Col. Kelser also perfected the rinderpest vaccine in the Philippines, the use of which resulted in the eradication of that scourge from those islands. This achievement is of tremendous economic importance, especially in view of the fact that the plans for the liberation of the Philippines are well under way. The protection given to the cattle industry through Col. Kelser's contribution to science will play a very prominent part in the ultimate economic security so necessary to any independent government.

His researches also brought about the control of epizoötic lymphangitis and surra in the Philippines. General Ireland officially referred to these services as "epoch making."

In the event that the horse is found to be a reservoir for the virus of human encephalitis, and the mosquito the vector, veterinary service will be of great importance for the administration of the recently developed chick-embryo vaccine for encephalomyelitis to every horse in the country. If a reservoir for poliomyelitis virus is proved to be of animal origin and an immunizing agent developed to eliminate the source, it requires no stretch of the imagination to visualize the prominent rôle that veterinary service will play.

MEAT AND FOOD INSPECTION

It is safe to assert that this is one of the most important functions of the veterinary corps today. The hazards of milk-borne diseases, together with the intestinal disturbances and parasite infestation which can result from unfit meat and meat and dairy products, have served to make the service of the veterinary corps indispensable.

The government specifications are well defined and in order to see that these specifications are complied with, the veterinary meat inspector must be able, at a glance, to differentiate between cow, bull and steer beef. In addition, he must be able to determine the age at slaughter of all steer beef, as well as the grade and condition. He must be able to differentiate between lamb and mutton, pork and bacon of young pigs from that of hogs, and chicken from fowl. He must be able to score butter, grade lard and have a well grounded training in the inspection of processed meat foods, such as hams, bologna, liverwurst, frankfurters, pork sausage and other specially prepared viands. His expert knowledge of the grading and classifying of eggs saves the government many thousands of dollars, since millions of eggs are purchased yearly for food. A veterinary officer must have a thorough knowledge of the health regulations governing the production of milk, particularly as it refers to the inspection and examination of cows, stables, utensils, personnel, etc., and milk products. He must be familiar with all types of unsoundness, deterioration, spoilage and other features which constitute a menace to the health of the troops.

The inspection of canned foods and fresh fruits and vegetables purchased for issue is also an important item in this phase of veterinary service. As this function of the veterinary corps is developed, an increasing number of problems will be encountered which will necessarily demand a corresponding increase in personnel to cope with them. Rapid progress is being made in the recognition of the causes of many diseases affecting poultry, swine and bovine sources of meat and other food products. Until there is a better coördination of state laws affecting meat and food sources and distribution, the army must protect its personnel by rigid inspection measures.

CONSERVATION SERVICE

There are three things that always run rampant during war: disease, vice and waste. When one considers the colossal and almost criminal waste during the World War, it is quite apparent that waste is as great an enemy as disease. The reclamation accomplished by the British veterinary service in the World War[5] was so outstanding that it is worthy of careful study. Animals rendered unfit for field service were sold to breeders, farmers, butchers and economizers (from the inception of the disposal of animals branch up to cessation of hostilities). [The methods of disposal are listed on page 20.]

From the following tabulation it can be seen that through efficient management, 5,316,138 pounds (or $26,580,690) were salvaged from an almost certain waste. Any service that can effect such a saving is certainly justified in its pride of achievement.

FOOD CONSERVATION

The rôle of the veterinary service in the all-important function of food conservation is outstanding. Those officers who served during the World War in the A.E.F. and cantonments in the United States have a

Methods of Disposal of Animals Unfit for Field Service	*No. of Animals*	*Approx. Amount Realized*
Sold to farmers and breeders	7,775	168,868
Sold to Paris horse butchers	28,384	364,438
Sold to local horse butchers	16,578	231,621
Dealt with by butchery detachments and issued to labor companies and prisoners of war	4,536	65,206
Dealt with in horse carcass economizers for by-products	7,061	28,244
	64,334	858,377

(Following the Armistice, up to March 31, 1919, the following disposals were made):

	No. of Animals	*Approx. Amount Realized*
Sold to farmers and breeders	112,132	3,778,907
Sold to Paris horse butchers	8,664	160,474
Sold to local horse butchers	20,679	414,919
Dealt with by butchery detachments for labor companies and prisoners of war	3,903	76,665
Dealt with in horse carcass economizers for by-products	6,699	26,796
	152,077	4,457,761

clear recollection of what really was an amazing waste of material, particularly food products, that was the result of carelessness or ignorance. Perfectly edible rations, such as bread, fresh meat, flour and canned goods, have been condemned and thrown away for no other reason than an unsatisfactory appearance.

In order to assure proper and wholesome food, the veterinary corps is relied upon to conduct a thorough inspection of all food products prior to issue and, if needed, to give expert opinion and advice where deterioration from heat or exposure has occurred after issue.

A few incidents from field experience may serve to acquaint those new to the service with some of the problems with which they may be confronted. It is safe to say that fresh meat causes a great deal of concern to commanding officers and mess personnel. When refrigerated meat is exposed to heat, it has a tendency to undergo certain changes during the process of defrosting. The color of the flesh exposed to the air becomes darker and on the surface of the connective tissue, pleura, or peritoneum, a certain slimy coating develops which is very often accompanied by a rather unattractive, if not repulsive, odor. This condition is a natural process of deterioration and is entirely a surface phenomenon. The meat is perfectly edible and preparation for use is very simple.

Two steps are necessary to remove the offensive and unappetizing contaminations. First, all those parts that can be trimmed with a knife must be scraped or cut off, and second, the surfaces must be washed carefully with solutions of table salt or baking soda. Many instances have been reported where meat that had been condemned as unfit for human consumption and buried because of its unpleasant odor was subsequently exhumed by order of a competent veterinary officer, trimmed and reissued for use.

It is important that refrigerated or chilled meat be cooked until the chill has entirely left it. It is certain to be tough as sole leather if placed in a pot or pan or the oven before it has been carefully prepared.

Another avenue of potential waste is caused by mould. In the American Expeditionary Forces there was an almost criminal waste of nourishing food caused by the appearance of a harmless mould on bread, *Pennicilium glaucum*, which is the same type of mould that is found in Roquefort cheese. The bread baked by American bakeries in the S.O.S. quite often arrived with mould in every seam or crack in the crust. The interior of the loaf and the uncontaminated portions of the crust were perfectly edible, but because it was unattractive, many mess officers ordered it thrown away rather than trim the mould and salvage the valuable food.

Canned food also has been wasted because of damaged labels or rust spots on the cans. It is possible for one "leaker"

to soil the labels of an entire case and, if enough time has elapsed, many rust spots will appear on the outside of other cans, which in no way affect the contents. Many cans also have been wasted as "bulgers" when the bulge was caused by a dent in the side of the can. A true "bulger" puffs at both ends, since it is due to the formation of gas in the can, and when pressed down and then released, it immediately springs back.

In cantonments there are many subterfuges practiced by kitchen workers who may be desirous of aiding a local merchant by making it appear that the food delivered is questionable. A specific case may serve to illustrate. In a certain camp a complaint was received that the eggs issued that day were of inferior grade, that the yolks broke when put in the frying pan and that, resultant, they could be used only for omelets. An inquiry from other units using eggs from the same shipment revealed that no fault could be found with the eggs issued. An investigation at the source of the complaint was made, the chef being requested to demonstrate how the egg yolks broke when put in the frying pan. This he did by holding the eggs 12 or 15 inches above the pan and dropping them from the shell. The shock upon landing produced the results of which he complained. Needless to say, the chef's friend did not succeed in selling any eggs in that camp.

It is desired to impress upon all potential commanding officers that efforts to prevent unnecessary waste are every bit as important as interest and activity in the evacuation and care of the sick and wounded. The defeat of the enemy "Waste" is largely an individual responsibility, and the rule should be inaugurated and enforced that no food will be destroyed without competent advice or authorization.

The veterinary corps assumes the responsibility of expert food inspection and its services should be requested whenever unattractive or questionable food demands reinspection.

Reiteration is here made of the prediction in the introductory paragraph that the victor in the next great war will be the adversary that has the most efficient animal transport and, of equal importance, the most efficient veterinary service to aid in the conservation of the animal strength and the enforcement of the compliance with specifications by contractors, as well as the prevention of waste through indiscriminate and ill-advised condemnation of edible food products. "The health of its animals underwrites the destiny of any nation. The United States is no exception."[6]

References

[1]*The Military Surgeon*, Dec., 1936.
[2]Report of military observer with Italian armies in East Africa, by Norman E. Fiske, Major Cavalry, U. S. A.
[3]*Fortune*, July, 1937.
[4]*The Military Surgeon*, Feb., 1937.
[5]"Our Servant the Horse," by Major Gen. Sir John Moore (late director of veterinary services, British Expeditionary Forces, France).
[6]L. A. Merillat: Vet. Med., May, 1939, p. 275.

The Production and Use of Draft Animals in Tunis*

The large plantation, where work is limited to short periods of great activity, is a good place for mechanical traction. The farms of 100 hectares or less, however, use animals. Between the two—100 to 400 hectares—both or either one is used according to personal desires of the farmer, but everywhere motorculture is losing a majority of its former advocates.

The author insists upon the advantages of the utilization of animals because they consume forage difficult to export. The breeds and crosses of oxen most appropriate for the purpose and the type of horses and mules the Tunisian farmer is raising to replace the tractors, are described in details that leave no doubt as to the trend toward the more economical method of farming.

When puzzled over a difficult case do not hesitate to consult a colleague.

At birth a colt is roughly three-fifths of its mature height and at 9 months of age it is about half as heavy as it will be when grown.—*Science Digest.*

*H. Cottier. Production et utilisation des animaux de trait par l'agriculture Tunisienne. Abs., Revue de Médecine Vétérinaire, xc (Sept., 1938), p. 525.

The Bovine Kidney in Health and Disease*

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A DISCUSSION of our observations on the anatomy of the kidney and some reference to the theory of kidney function is desirable, for without this information one can not understand the altered functions associated with structural changes due to disease.

The gross anatomy of the bovine kidney differs from that of the other domesticated animals in the persistence of the fetal lobation. The number of lobes varies from 16 to 32 in each kidney with an average of 24 in the cases studied. Each lobe consists of

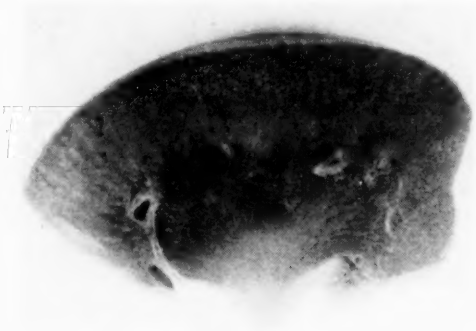

Fig. 1. Sagittal section through lobe of bovine kidney (x 2).

an irregular, cone-shaped mass, the medulla, surrounded on all sides, except where the apex extends into the calyx, by the cortical portion of the lobe.

Both the medulla and the cortex show a striated condition, the striae extending from the apex of the medulla to the base and continuing outward through the cortex (fig. 1). The striated appearance is due to the definite location of the various segments of the tubule in the kidney with reference to other segments and their relationships to the arteriolar and capillary blood supply. The nephron (corpuscle and tubule) begins in the darker stria of the cortical portion. We have made no effort to estimate the number of nephrons in the bovine kidney. Calculations on the human kidney indicate that there are 800,000 to 1,000,000 in each kidney.[1]

The glomerulus with its afferent and efferent glomerular arteriole is always to be found in the darker stria of the cortex. It is surrounded by the wall of the sac-like proximal end of the proximal convoluted tubule (Bowman's capsule), this capsule and the glomerulus constituting the renal (Malpighian) corpuscle. The tubule, upon leaving the corpuscle, makes a large number of convolutions (the proximal convoluted segment), after which it passes over into the lighter-colored stria of the cortex (the medullary ray) and descends toward the medulla as the straight terminal portion of the proximal convoluted tubule.

Shortly after entering the lighter colored stria of the medulla, the size of the tubule and the character of the epithelium change abruptly and the tubule continues downward as the straight descending limb of Henle's loop. Some of the tubules extend to the apex of the medullary portion before turning in their course to pass upward through the lighter colored stria of the medulla as the straight ascending limb of Henle. Upon reaching the lighter colored stria of the cortex, the ascending limb continues upward until it reaches a level approximately that of the corpuscle of its origin, then passes over into the darker colored stria of the cortical portion, reaches the corpuscle of its origin to which it is attached at the vascular pole (without entering it), and then continues as the distal

*This paper is based in part on data recorded in a thesis submitted by the senior author to the faculty of the Michigan State College in partial fulfillment of the requirements for the degree of Master of Science in Animal Pathology and in part on data obtained since the publication of the thesis. Presented at the 75th annual meeting of the A.V.M.A., New York City, July 5-9, 1938.

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convoluted portion of the tubule. After making a comparatively few convolutions (the distal convoluted segment) it passes over into the lighter colored stria of the cortex and, uniting with identical segments of other tubules, it becomes the straight collecting tubule and descends through the lighter colored stria of the cortex and medulla as the straight collecting tubule, finally opening on the apex of the medullary cone into the calyx.

When the cortex was sectioned in a plane at right angle to the axis of the arm of Henle's loop, it was found that the medullary ray of the cortex is a column consisting of five to 13 collecting tubules, 33 to 117 straight terminal portions of the proximal tubules, and 32 to 104 ascending arms of Henle's loop, surrounded by cortical structures (the labyrinth) (fig. 3). The number of each of the latter two should be the same. The discrepancy is no doubt an error in counting or identification. Also when the medulla was sectioned in a plane at right angle to the axis of the tubule, it was seen that it consists of columns of paralleling capillaries surrounded by the segments of the tubules (fig. 4). These definite relationships of the structural elements to each other as to position explain the striae recognizable in gross.

There are significant differences in the size, and length, and in the character of the epithelium, of the various segments of the tubule. No attempt has been made in this study to determine the length of the segments, but measurements of the diameter have been made and are shown in table 1.

The size and length of the proximal convoluted portion are such that this segment constitutes the major portion of the cortical mass of the kidney. No conception of the comparative mass of this portion can be obtained without reconstructing the tubule in wax or blotting paper from serial sections, or by studying specimens obtained by the technic of maceration. Figure 2 illustrates a reconstruction of the proximal and distal convoluted tubule, the corpuscle and afferent and efferent glomerular arteries from a human specimen. (Courtesy *Archives of Pathology* and the authors.[2])

Figures 5 and 6 illustrate specimens from the kidney of a calf obtained by maceration.

The generally accepted theory of urinary function assumes that the chief function of the glomerulus is the removal of water, salts and nitrogenous waste from the blood into the tubule, and that of the tubule is to return to the blood a large proportion of the water, the threshold substances and some of the other constituents passed into

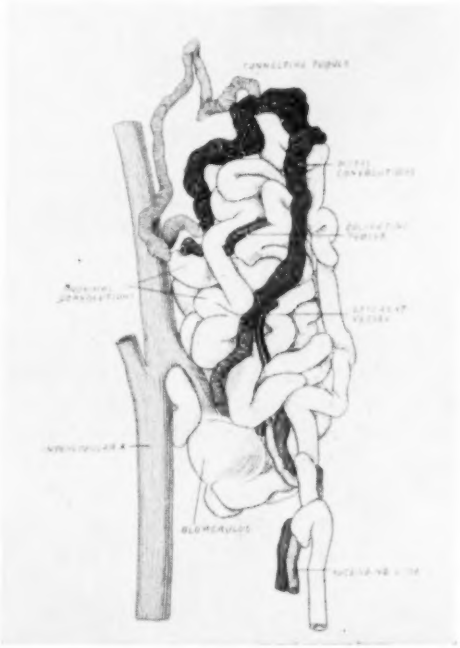


Fig. 2. Wax reconstruction of the renal corpuscle, proximal and distal convoluted tubule of the human kidney. (Reproduced from the Archives of Pathology, xv (1933), p. 763.)

the tubule by the glomerulus. The combined function of the glomerulus and the tubule aids in keeping the composition of the blood constant. There is no available information on the amount of the work of the bovine kidney, but calculations based on the function of the human kidney indicate that the volume of fluid passing from the glomeruli of the two kidneys into the tubules varies from 100 to 250 cc. per minute with a mean of about 170 cc. per minute.[3-5] If this mean volume is computed on a 24-hour output, it is equivalent to approximately 65 gallons.

It is believed that the fluid (the glomerular filtrate) that is passed into the subcapsular space of the renal corpuscle contains the salts and nitrogenous waste products in the same concentration as they exist in the blood but that the healthy glomerulus does not permit the proteins of the blood to escape. As the fluid passes through the tubule, it is concentrated to one one-hundredth or less of its original volume. In other words, 99 per cent or more of the fluids and all or a certain proportion of the other constituents are returned to the blood. The process of concentration of the filtrate is assumed to involve three processes: the absorption of water, the diffusion of the diffusible substances and the secretion of the threshold substances back into the blood capillaries.

In order that such a comparatively large volume of fluid may pass from the blood into the tubule and that an almost equally large volume may pass from the tubule back into the blood, it would appear that the circulatory mechanism of the kidney must provide three requisites: (1) The passage of a relatively large volume of blood through the kidney; (2) the exposure of a relatively large area of blood to a filtering surface; and (3) the exposure of a relatively large capillary area to the surface of the urinary tubules to provide for absorption, diffusion and secretion.

Calculations indicate that the arterial supply is such that a volume of blood equal to the total blood volume may pass through the kidneys in about 18 minutes.[6,7] It also appears that the ratio of blood volume in the glomerulus to the area of capillary wall is such that 1 cc. of blood is exposed to a filtering surface of approximately 1,200 square inches.[8] The capillary network around the tubules provides the third requirement.

An understanding of the relationships of the tubule to the vascular system is so fundamental a requisite for an understanding of the pathology of the kidney that a further discussion of this seems desirable. In the developing tubule, the proximal end of the proximal convoluted tubule is a closed, sac-like vesicle.

There arises in the course of one of the smaller branches of the interlobular artery a tuft of capillary loops that extend outward and contact the closed end of the tubule; each loop extends itself into the end of the tubule, carrying with it a fold of the wall of the tubule. The glomerulus then becomes a group of some 40 or 50 individual capillary loops interspersed in the course of an artery, each loop sheathed with the invaginated fold of the wall of the tubule. The epithelial cells of this invaginated portion of the wall of the tubule constitute a second cellular layer through which the glomerular filtrate must pass in its passage from the capillary to the subcapsular space of the corpuscle and thence into the tubule. They are known as the

CAPTIONS TO ILLUSTRATIONS ON OPPOSITE PAGE

Fig. 3. Section through cortex of kidney at right angle to the axis of the medullary rays. Note column consisting of the straight terminal portion of the proximal convoluted tubules, the ascending arms of Henle's loop, and the collecting tubules, surrounded by cortical material (x 35).

Fig. 4 (upper right). Section through outer medulla at right angles to the medullary ray. Note the columns of capillaries paralleling the medullary rays (x 113).

Fig. 5. Renal corpuscle and part of the proximal convoluted tubule of the bovine kidney. Specimen obtained by maceration (x 95).

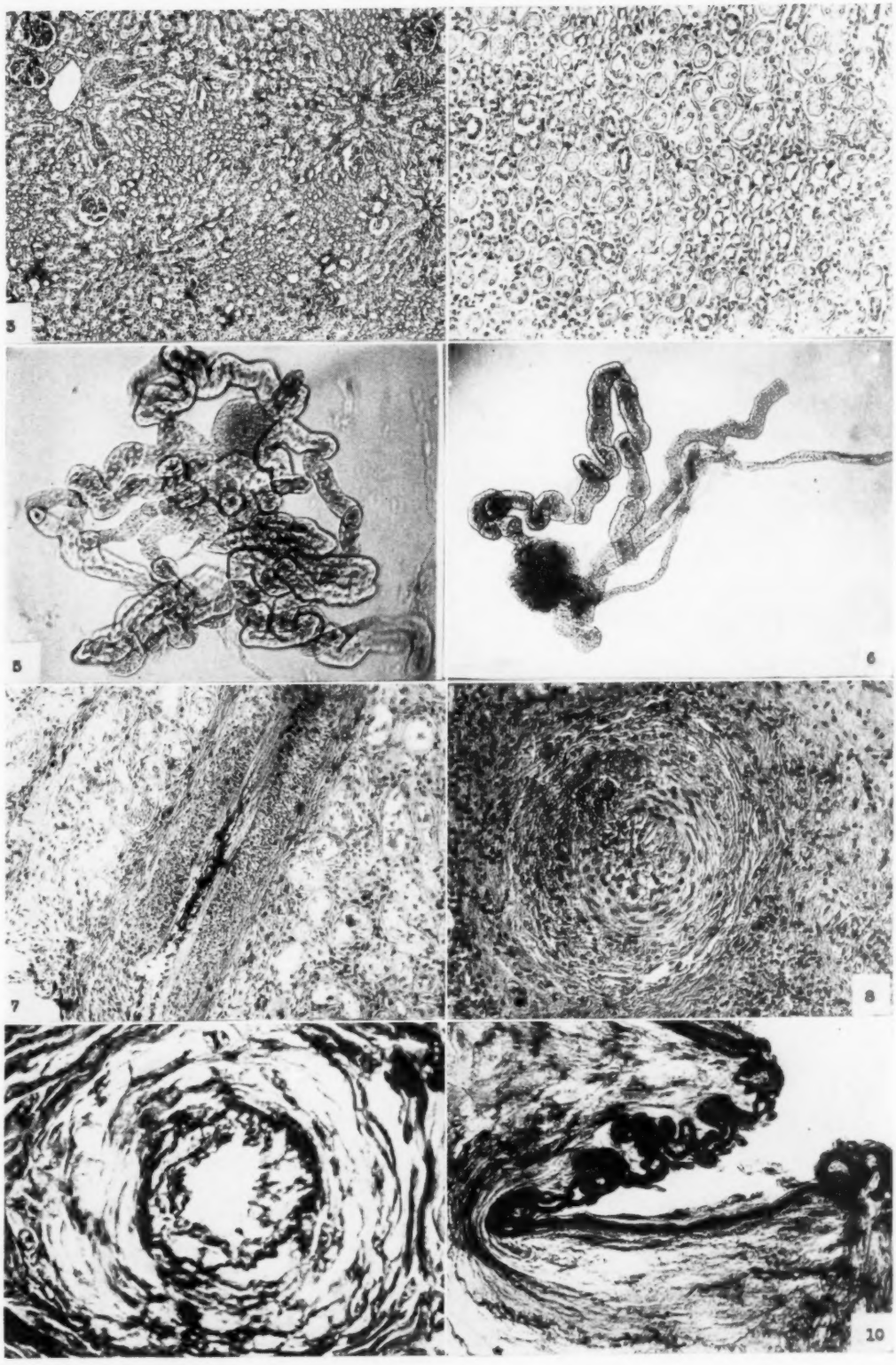
Fig. 6. Renal corpuscle, part of proximal convoluted tubule A, part of ascending arm of Henle's loop, B, and part of distal convoluted tubule C. Specimen obtained by maceration (x 83).

Fig. 7. Section of interlobular artery showing vacuolization of the media (x 93).

Fig. 8. Section of interlobular artery showing proliferation of the cells of the intima. There is also a hemorrhage in the media (x 100).

Fig. 9 (lower right). Section of interlobular artery showing thickening of the internal elastic membrane and intima. Verhoeff's elastic tissue stain (x 495).

Fig. 10. Section through interlobar artery. At A there is seen a greenish-yellow hyalin material between the internal elastic membrane and the intima. Note the elastic membrane is not folded at this point, as if rendered rigid by some process. Verhoeff's elastic tissue stain (x 335).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visceral glomerular epithelial cells and are continuous at the vascular pole of the corpuscle with the parietal cells of Bowman's capsule.

Each individual capillary loop of the glomerulus may be compared with the hot water coil in a circular fire box, with the difference that each loop has invaginated the wall and is thereby covered by the invaginated portion. That portion of the artery proximal to the interlobular artery now becomes the afferent glomerular arteriole, and the distal portion becomes the efferent glomerular arteriole.

The efferent glomerular artery then divides into a system of capillaries that forms a network surrounding the tubule. For a long time it was thought that the tubule obtained its capillary blood supply only after the blood had passed through the glomerulus. This is still thought to be essentially true, although in at least some of the cases a small branch called the vessel of Ludwig passes from the afferent to the efferent glomerular artery without passing through the glomerulus. This branch may become of great importance in certain diseases of the glomerulus which lead to occlusion of the capillary loops.

An understanding of the relationship of the capillaries to the tubules discussed above is not only of fundamental importance to an understanding of the theory of kidney function but is of equal importance in understanding certain pathological conditions of the kidney.

Normal kidney function depends upon the following requisites, the primary impairment of any one of which may not only alter or suppress the function of the nephron but may lead to structural and functional impairment of all the other requisites of the particular nephron involved:

1. There must be normal arterial blood supply to the glomerulus and patency of the capillary loops of the glomerulus. Structural alterations in the interlobular and afferent glomerular artery influence the former; proliferative processes in the glomerulus may prevent the latter. Without these the necessary volume of blood exposed to the filtering surface of the glomerulus is not possible and the quantity of filtrate is lessened. Inadequacy of either also may lead to degenerative and atrophic conditions of the corresponding tubule with a replacement fibrosis of the intertubular structures.

2. Another requisite is the integrity of the capillary endothelium and visceral epithelium of the glomerulus. As a result of the normal character of these structural elements, only certain of the constituents of the blood pass into the tubule as it courses through the glomerular capillary loops. Alterations in their characters—for example, degenerative and necrotic conditions—permit the escape of certain constituents of the blood that usually are not allowed to escape. Injury to these structures is thought to be the fundamental basis for albuminuria and hematuria of kidney origin.

CAPTIONS TO ILLUSTRATIONS ON OPPOSITE PAGE

Fig. 11. Section of interlobar artery showing calcification of the intima. Von Kossa's nitrate of silver stain (x 90).

Fig. 12. Section through cortex showing atrophy of tubules and intertubular fibrosis (x 59).

Fig. 13. Section through cortex showing atrophy and loss of tubules, a zone of fibrosis and hyalinization around the glomerulus and focal accumulations of lymphocytes and macrophages (x 47).

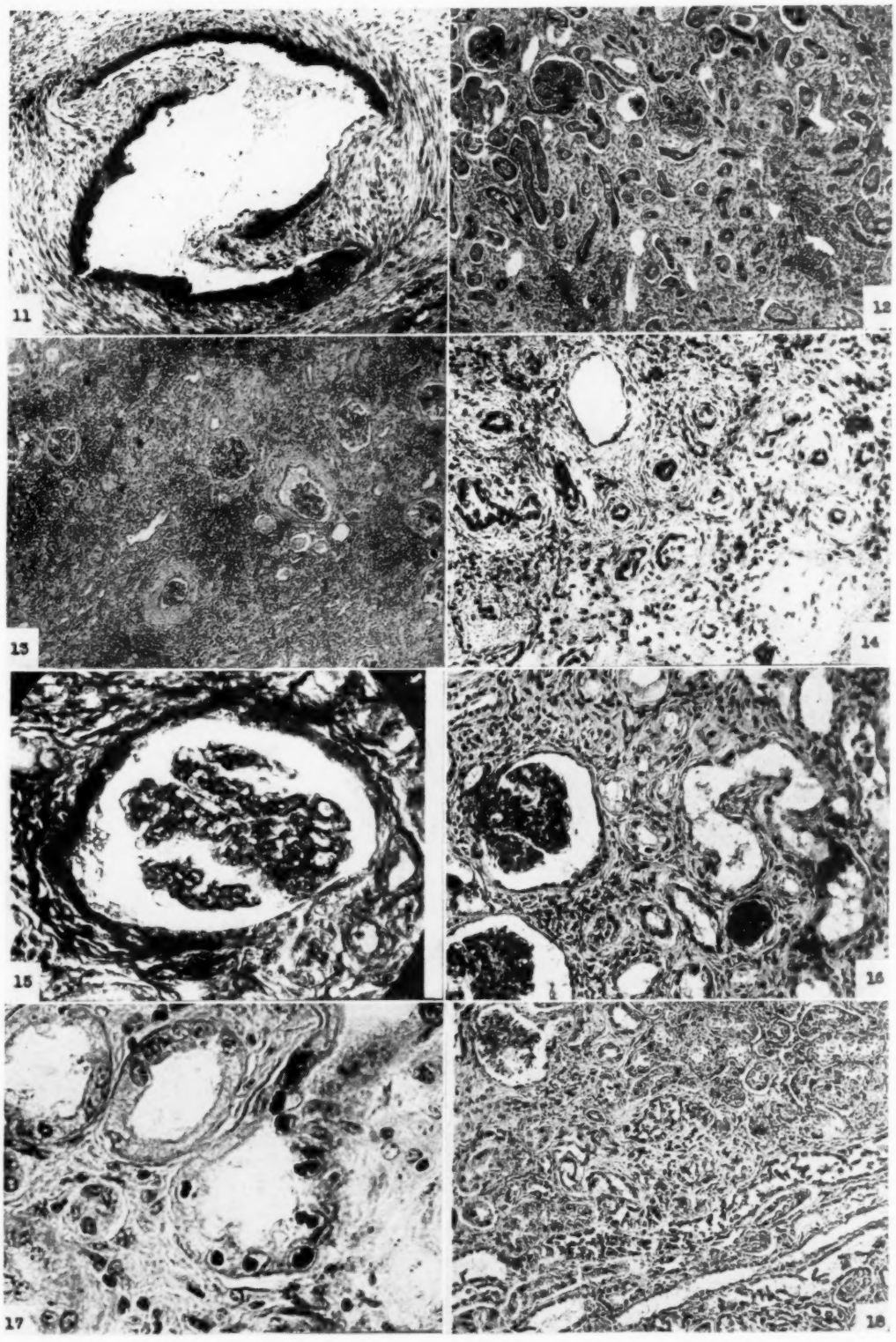
Fig. 14. Section through cortex showing concentric rings of collagen around the atrophied tubules (x 117).

Fig. 15. Section through renal corpuscle showing thickening and hyalinization of Bowman's capsule (x 327).

Fig. 16. Section through cortex showing atrophy of some of the tubules, distention of others. Four of the tubules show calicification of the epithelium. Von Kossa's silver nitrate stain (x 117).

Fig. 17. Section through cortex showing spherical homogenous bodies in the nuclei of some of the cells of the proximal convoluted tubules. Russell's carbol fuchsin stain for hyaline (x 366).

Fig. 18. Section through cortex showing desquamation of the epithelium of some of the collecting tubules and what appears to be proliferation of the epithelium in others (x 84).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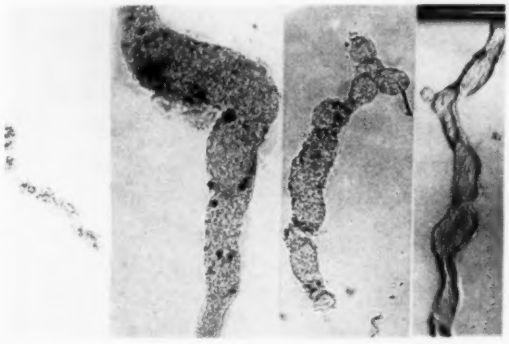
3. The integrity of the tubule and its epithelial lining is an essential. Degenerative and necrotic conditions of the epithelium, atrophy of the tubule, occlusions of the lumen by casts, constrictions and occlusions due to proliferative processes and cicatrization in the peritubular areas interfere with, or prevent, the processes of absorption, diffusion and secretion.

If one keeps these requisites in mind in considering the structural alterations in the kidney, the altered functional implications of such structural alterations are obvious.



Figs. 19-22 (left to right). Segments of urinary tubules obtained by maceration. Figs. 19 and 21 show constrictions, presumably caused by cicatrization of the intertubular structures. Fig. 20 illustrated a distended tubule, presumably caused by occlusion at some point. In Fig. 21 the contents of the tubule are inspissated (fig. 19, x 130; 20, x 110; 21, x 128; 22, x 110).

The pathology of the kidney discussed in this paper is based on a study of the kidneys obtained from 24 animals out of the dairy department's experimental herd, which has been maintained for the past 16 years for the study of various nutritional problems. They were taken from a group of animals maintained on low magnesium diets consisting of whole milk, corn starch or rice krispies, viosterol, iron, copper and manganese. Wood shavings or paper pulp was used as roughage. For more detailed data regarding feeding procedures, symptoms and blood values, the papers of Huffman and associates should be consulted.[9,10] Generally, the calves were placed on this experimental ration at about one month of age and at the time of autopsy varied in age from 90 to 450 days, with an average age of 218 days. During the latter part of the experiments the calves often showed tetany and symptoms with low plasma magnesium similar to those of calves with low plasma calcium.

Some of the animals were slaughtered; others died. In either case, material for microscopic study was placed in fixing solution with as little delay after death as possible. Both formalin and Zenker's fixation were used, and frozen tissue sections and paraffin-method sections were made from all pathological cases. Sudan IV stain for fat, hematoxylin-eosin stain, Verhoeff's elastic tissue stain, Mallory's aniline blue stain, Heidenhain's azan-carmine stain, Russell's carbol fuchsin stain for hyaline, and Von Kossa's nitrate of silver stain for calcification were used. Formalin fixed material from some of the cases was macerated in concentrated hydrochloric acid for 24 to 48 hours, washed in distilled water, after which the nephrons and tubules were separated by gentle manipulation with teasing needles. This technic has proved of especial value in the study of both normal and pathological material.

The cardiovascular and other lesions, except those of the kidney, observed in these animals have been described by Moore, Hallman, and Sholl.[11] The principal change reported by them was degeneration and deposition of calcium salts in the yellow elastic fibers of the endocardium, the aorta and other larger arteries, the jugular vein, the diaphragm, the trabeculae of the spleen and the Purkinje's fibers of the heart.

As a rule, the kidneys of these animals showed extensive damage, the degree of severity varying considerably in the different animals. In a few cases there was widespread tubular necrosis, as if the kidneys had been flooded with a severe toxin shortly before death. In the majority of the cases, however, the lesions were of a subacute or chronic nature. In the more prolonged cases the capsules were stripped with difficulty, leaving a roughened and irregular surface not uniform in color. Such kidneys were cut with increased resistance with the loss of normal cortical striations.

The majority of cases had not progressed to this stage and, when viewed from the surface after stripping, the capsule showed

TABLE I*

Age of Animal	Renal Corpuscle						Prox. Con. Tubule						Term. Port. of Prox. Con. Tubule						Distal Con. Tubule						Descending Limb of Henle						Ascending Limb of Henle					
	Macerated			Stained			Macerated			Stained			Macerated			Stained			Macerated			Stained			Macerated			Stained			Macerated			Stained		
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
1 mo.	170	125	149	140	105	128	70	35	45	51	28	38	38	14	27	30	13	23	58	26	36	48	27	36	18	6	11	16	8	12	30	18	22	25	13	17
1 yr.	210	140	170	184	140	159	70	35	53	70	32	47	52	26	38	50	24	32	79	26	41	51	29	35	17	4	12	21	9	14	31	9	23	25	12	18
1 yr.	219	157	180	218	175	189	87	26	54	70	37	52	48	26	40	44	19	32	79	30	47	59	25	36	22	6	13	20	9	16	35	18	28	25	13	21
2 yrs.	218	149	172	201	140	167	70	35	51	76	44	59	41	18	32	38	24	30	105	26	44	45	24	34	30	6	14	22	8	13	30	15	27	30	15	21
2 yrs.	280	175	212	245	166	190	87	35	51	68	33	49	48	12	36	46	17	34	70	26	45	65	25	46	22	6	13	17	6	11	30	15	25	31	13	21
2 yrs.	271	175	226	227	175	196	79	35	62	64	38	50	57	30	43	41	17	32	79	35	49	51	29	39	18	6	12	22	8	14	44	14	27	27	13	21
3 yrs.	257	154	213	195	150	162	70	52	58	62	34	49	59	43	50	44	31	33	64	36	54	62	33	45	25	14	19	25	16	22	38	28	34	38	22	30
4 yrs.	284	115	194	227	165	195	74	42	57	63	38	52	65	36	53	50	29	34	70	40	59	64	33	47	26	9	18	29	16	22	37	22	32	28	19	25
4 yrs.	250	190	229	208	173	194	76	41	58	62	36	49	70	45	55	56	31	41	70	42	56	75	41	52	31	13	20	35	13	26	39	23	33	45	26	34
6 yrs.	280	210	249	253	180	217	70	45	56	78	43	57	60	44	52	48	28	38	113	51	61	62	34	46	30	14	21	29	19	25	39	25	31	49	26	36
6 yrs.	290	218	259	260	147	221	72	52	60	75	43	56	70	37	57	50	33	41	71	45	56	64	31	46	33	10	21	31	19	24	40	25	31	39	22	30
7 yrs.	265	210	236	256	172	208	65	47	54	74	43	56	70	41	54	50	27	39	70	43	55	68	39	51	25	15	20	35	19	27	45	30	35	48	31	36
7 yrs.	258	210	239	236	172	216	70	43	56	64	42	53	64	46	54	53	34	45	70	40	56	71	41	49	28	14	20	26	15	21	38	26	31	44	25	33
9 yrs.	245	175	211	210	157	174	87	35	59	64	43	54	52	22	47	54	25	37	70	35	47	60	32	49	26	6	14	24	11	17	52	18	27	25	11	19

*The data shown are the result of measurements of 25 units for each animal given. The measurements were made on material obtained by macerating formalin-fixed tissue in hydrochloric acid and also paraffin, hematoxylin-eosin stained sections of Zenker's fixed tissue.

The abbreviations, max., min., prox., con., term., and port., indicate maximum, minimum, proximal, convoluted, terminal, and portion, respectively. The numerals indicate diameter in microns.

a few or many focal lesions of a grayish color, varying from one to a few millimeters in diameter. Occasionally the foci were larger. In some kidneys practically every lobe would show a few or many foci. Upon section of the cortex, many of the

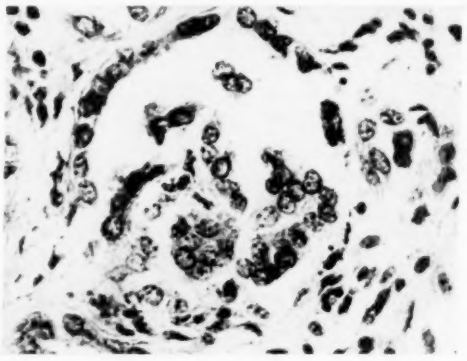


Fig. 23. Section through cortex showing desquamation of the epithelium of some of the collecting tubules and what appears to be proliferation of the epithelium in others (x 375).

lesions were seen to be linear, extending toward the medulla but, as a rule, not entering it.

The pathology of the kidney appeared to have its origin in the smaller branches of

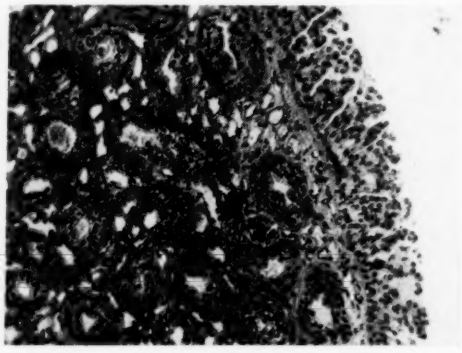


Fig. 24. Section through apex of pyramid showing metaplasia of the epithelium of the collecting tubules (x 120).

the renal artery. The media of the interlobular branches showed what appeared to be a vacuolar degeneration (fig. 7). This was observed to a variable extent in 18 of the 24 cases studied. The nature of this degeneration is not known. It had the appearance of a fatty change but did not stain with the usual fat or lipoid stains.

In the more advanced cases proliferation with thickening of the intima was observed (figs. 8 and 9). Often the endothelial cells of affected vessels were enlarged and appeared to contain an unusually large amount of cytoplasm, and in some instances showed evidence of desquamation. Occasionally the internal elastic membrane was thickened and, when observing a transverse section of an artery, a segment of the membrane would be seen that had not been thrown into the usual folds upon contraction of the arterial wall, as if rendered nonflexible. In some of the arteries, in sections stained by Verhoeff's method, there appeared a narrow band of greenish-yellow hyaline material between the internal elastic membrane and the endothelium (fig. 10). Calcification of the arterial wall was seen in only one case (fig. 11).

The most conspicuous lesions occurring to a variable, and in some cases to an extreme, degree were atrophy of the tubules, and productive and cellular infiltrative processes in the intertubular tissues of the cortex, with subsequent cicatrization. The latter was especially conspicuous as a narrow zone around the capsule of the renal corpuscle and around the convoluted tubule. Often the connective tissue fibers appeared as a number of concentric rings around the renal corpuscle and the proximal convoluted tubules (figs. 12, 13, and 14).

In the advanced lesions the basement membrane of Bowman's capsule and that of the proximal tubules appeared as a greatly widened, irregular, homogeneous hyaline band. It is not known whether this condition is a result of the precipitation of some substance or not (fig. 15).

Atrophy of the tubules and productive and infiltrative processes had progressed to such an extent in some areas that there was a complete absence of the tubules. In the same section in which the above lesions were seen, numerous largely distended tubules with atrophied epithelium could be observed (fig. 16). Studies of specimens obtained by the technic of maceration appeared to give the explanation of the wide variation in the appearance of the tubules. Upon examination of paraffin sections, it

was observed, especially in the moderately developed cases, that the atrophied tubules and the associated intertubular processes had a patchy distribution in the cortex, sometimes extending into the outer portion of the medulla.

If the arterial lesions described above are the primary ones (which we think quite probable), the distribution of the involved areas in the cases of moderate extent would correspond with the distribution of the affected arteries. It is obvious that because of the long and tortuous course of a tubule from the renal corpuscle to the apex of the medullary pyramid, any particular tubule might be affected by the productive and cicatrization processes at one or more points in its course or affected to a variable extent at a number of points in its course. If a tubule becomes considerably constricted at some point, there is a probability that obstruction might occur at that point by the accumulation of débris—desquamated cells or casts—that normally would pass on to the pelvis of the kidney. Permanent and complete occlusion does occur not only as a result of the constriction of the tubule but by complete loss of the tubular structure at some point or points in its course as a consequence of the intertubular processes. That portion of a tubule proximal to the renal corpuscle from an occluded point in its course may then become distended by the products of glomerular filtration, if the glomerulus continues to filter. With absorption of the fluids in the tubule, the nitrogenous wastes and cell debris appear as a homogeneous, structureless and sometimes hyaline mass in a greatly distended tubule. A study of specimens obtained by maceration shows that a tubule may be constricted at one or more points in its course and distended at others (figs. 19-22).

In the more normal areas of the affected kidneys the tubular epithelium showed a variable amount of cloudy swelling and vacuolar degeneration. In many of the nuclei of the cells of the proximal convoluted tubules small, irregular, spherical-shaped homogeneous masses, varying from 1μ to 8μ in diameter, of a red color when stained with Russell's carbol-fuchsin, were observed (fig. 17). Usually the nuclei containing such inclusions were somewhat enlarged.

In two of the animals studied, calcification of the epithelium of the tubules was observed in the more advanced lesions (fig. 16). In two of the cases studied there was evidence of proliferation and desquamation of the epithelium of the cortical and medullary portions of the collecting tubules (figs. 18 and 23). Metaplasia of the epithelium of the terminal portion of the collecting tubules was observed (fig. 24). The glomeruli as a rule were but slightly affected, although in some there was evidence of intraglomerular proliferation and adhesions between the glomerulus and Bowman's capsule. Very infrequently a fibrosed and hyalinized glomerulus was seen.

The direct cause of the lesions discussed is not known. Theoretically, atrophy of the tubules with a replacement fibrosis may result from a diminished blood supply due to the arterial lesions described. Just how important some kind of intoxication as a cause of the atrophy of the tubule and the processes observed in the intertubular areas may be, is unknown. The lesions in the kidney and those of the aorta and other blood vessels, the spleen, diaphragm and heart, reported by Moore *et al*,[11] point suspiciously to some kind of intoxication as an important causative factor.

References

[1]Moore, R. A.: The total number of glomeruli in the normal human kidney. Anat. Rec., xlviii (1931), p. 153.

[2]Oliver, J., and Lund, E. M.: Plastic studies in abnormal renal architecture. Arch. Path., xv (1933), p. 755. Fig. 4 was redrawn by the authors from fig. 37a, plate V, in Peter: Untersuchungen über Bau and Entwickelung der Niere, Jena, Gustav Fischer, 1909.

[3]Rehberg, P. B.: The rate of filtration in the human kidney. Biochem. Jour., xx (1926), p. 447.

[4]Holten, C., and Rehberg, P. B.: Studies on the pathological function of the kidneys in renal disease. Acta Medica Scandinavica, lxxiv (1930), p. 479.

[5]Medes, G., Herrick, J. F., and Baldes, E. J.: The relationship between glomerular filtration and flow of blood to the kidney. Proc. Staff Meet. Mayo Clinic, vii (1932), p. 549.

[6]Howel, W. H.: Text Book of Physiology. 12th ed. (W. B. Saunders Company, 1933.)

[7]Dukes, H. H.: The Physiology of Domestic Animals. 4th ed. (Comstock Publishing Company, 1937.)

[8]Landis, E. M.: Capillary pressure and capillary permeability. Physiol. Rev., xiv (1934), p. 404.

[9]Duncan, C. W., Huffman, C. F., and Robinson, C. S.: Magnesium Studies in Calves. I. Tetany produced by a ration of milk or milk with various suplements. Jour. Biol. Chem., cviii (1935), p. 35.

[10]Huffman, C. F., and Duncan, C. W.: Magnesium carbonate and magnesium oxide supplements to whole milk diet for dairy calves. Jour. Dairy Sci., xix (1936), p. 440.

[11]Moore, L. A., Hallman, E. T., and Sholl, L. B.: Cardio-vascular and other lesions associated with low magnesium diet in calves. (To be published.)

Discussion

DR. H. C. H. KERNKAMP: I think your study has been very, very interesting. You said something about the descending tubule returning and attaching to the glomerulus.

DR. HALLMAN: To the renal corpuscle.

DR. KERNKAMP: That is not the glomerulus.

DR. HALLMAN: That is due to the fact that very early in the development of the tubule or nephron, the end is attached to the renal corpuscle. Then the tubule grows during fetal and embryonic life. Since it is attached at both ends, the tubule becomes convoluted and torsive. It does not enter the course.

DR. KERNKAMP: Once a fluid filtrates through the glomerulus, entering the tubule, it is not reabsorbed normally.

DR. HALLMAN: I do not think anyone knows the exact functions of the kidney, but the most generally accepted theory is that the function of the glomerulus is to pass into the tubule the things that are to be excreted in the urine. In accomplishing this work, an enormous amount of water passes with those. I believe that the nitrogenous waste and salts are supposed to be of the same concentration in the fluid that enters the tubule as the fluid in the blood. This fluid is reduced as it passes through the tubule to about one one-hundredth or less of its volume, and that passage of the fluid carries along with it all of certain salts and some of other salts, and the amount of urine voided is one one-hundredth or less of the amount of filtrate. There is a difference in opinion among physiologists as to the nature of this process. To me, the most logical explanation of the passage of the fluid from the tubule into the blood is that there is absorption of water, diffusion of the diffusible substances, and secretion from the tubule back into the blood capillaries. These are the processes that explain it. I do not know whether Dr. Dukes agrees with that or not, but to me that is the most significant explanation.

I know there is a tendency to ignore the probability of secretions, but I do not understand how all of certain salts may pass from the tubule into the blood or how an animal can secrete as high a protonic urine as far as salt is concerned. I think the absorption of water, the diffusion of the diffusible substances and the secretion of certain things plan the return of this enormous volume of fluid into the blood.

It might be of interest to mention the fact that according to calculations that have been based on the findings of the human kidney, from 150 to 250 cc. of fluid passes from the glomeruli of the kidneys into the tubules within one minute, with a mean of about 170 cc. per minute, if we reduce it to a mean of 24-hour output. It means that with about 64 centimeters of fluid passing through it, 99 per cent of that would be returned to the capillaries.

CHAIRMAN DUKES: I might add in this connection that the reabsorption in the tubule is believed to be a selective reabsorption—not just a reabsorption by reason of diffusion osmosis, but the epithelial cells of the tubule contribute energy from the tubule back into the blood. For want of a better name it is called a selective reabsorption.

DR. HALLMAN: If I could add one point, my contention of normal renal functions is that three things are required: A normal blood supply or capillary blood supply through the glomerulus, and it must remain open; the maintenance of the integrity of the capillary endothelium and visceral epithelium; and the integrity of the tubule and its epithelial lining. Alterations in any one of these may affect the anatomy and, therefore, the functions of either of the other two. Those three things must be there. If any one of them go bad, the function of the nephron is disturbed.

Vaccination for Bang's Disease*

The U. S. bureau of animal industry has stopped issuance of permits to manufacturers for the production and distribution of fully virulent live-culture Brucella vaccines for the prevention and control of Bang's disease in adult cattle. . . The vaccination of infected adult cattle does not do any particular harm or good. . . There were at least two threatened suits for damages in Ohio based on the fact that non-infected adult cattle had been vaccinated without the owner being informed that it would cause them to react to the agglutination blood test and also render the herds ineligible to enroll in the Federal-state Bang's disease project and receive indemnity. . . The vaccination of adult cattle should be frowned upon except in certain rare circumstances.

There are 77 medical schools, 38 dental colleges, 10 veterinary colleges and 69 colleges of pharmacy in the United States which are classified as "recognized."

*Modified statements of C. R. Donham before the Iowa Veterinary Medical Association. See May issue of JOURNAL, p. 488.

Some Causes of Sterility in Cows*

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THE TERM "sterility" commonly is used in veterinary literature to designate any condition of infertility or inability of a cow to deliver at term a normal viable fetus.

The economic importance of sterility of cows has long been recognized, but it was not until Albrechtsen[1] in 1920 and Williams[2] in 1921 published books on this subject that interest in this field of veterinary practice became general. My experience in this field began in the spring of 1923. Since then, I have had the opportunity to study and treat many cases of sterility in several large herds of dairy cattle. In this paper, I plan to discuss briefly the diagnosis and treatment of some of the more common causes of sterility of cows.

ETIOLOGY

The causes of sterility are various. Age, physical condition, diet, environment, and season of the year are important primary factors. Certain diseases cause sterility by affecting the genital tract directly or indirectly.

Bang's disease is undoubtedly the most important primary disease causing sterility in cattle. It commonly causes inflammation and necrosis of the cotyledons and placenta in pregnant animals. Various secondary lesions of the cervix, uterus, and fallopian tubes are frequent. It may also cause inflammation of the genital tract of nonpregnant cows and heifers and, in infected herds, is a common cause of sterility in the latter.

When Bang's disease was eradicated from some herds, other causes of sterility became apparent. It is now generally recognized that deficient diets, environment, and numerous other factors are common causes of diseases of the ovaries and uterus. The parasitic organism, *Trichomonas bovis*, is known to be present in many areas. Many investigators think that it is at present an important cause of sterility in some herds. I have had no experience with trichomoniasis and, therefore, shall not discuss it.

LESIONS

Cervicitis is the most frequent specific lesion of the genital tract of cows observed by the writer. It may be present as a primary disease or it may be secondary to, or associated with, metritis, salpingitis, or vaginitis. It commonly causes sterility by creating an unfavorable environment for the spermatozoa, or, if the disease is slight and conception occurs, the presence of exudates, resulting from inflammation or hypertrophic cervical folds, may prevent satisfactory closure of the cervix and abortion may occur later. It also is possible for the inflammation in the cervix to extend forward into the uterus and cause metritis.

Unilateral salpingitis and endometritis are perhaps next to cervicitis in frequency of occurrence. These lesions probably are a more frequent cause of nonspecific abortion in cows than is generally recognized. Fertilization and conception can occur in the nonaffected horn of the uterus. The disease process in the fallopian tube or the apex of the other horn of the uterus may later extend to the cotyledons and placenta. If the disease is severe, it may result in abortion of the premature fetus; if it is less severe, it may cause only retention of the fetal membranes following delivery of the fetus at term.

Before attempting to diagnose the cause of sterility in a cow, one should, when possible, obtain a record of the breeding efficiency of the entire herd, including the sire, as well as that of each cow examined. This history frequently gives us a valuable clue to the cause of the sterility present. All pertinent information obtained should

*Presented at the annual meeting of the Southern States Veterinary Medical Association, Knoxville, Tenn., November 3-5, 1938.

be entered as a permanent record of the case.

GROSS EXAMINATION

After obtaining the above information, I make a gross examination of the genital tract and ovaries, proceeding as follows: The cow is confined in a stanchion and an assistant holds the tail up over the cow's back or to one side to expose her external genitals. The vulva and surrounding areas are first thoroughly cleansed with soap and water and then a glass speculum, 16 to 18 inches in length and 1½ to 1⅝ inches in diameter, is carefully introduced into the vagina. The interior of the latter is illuminated by directing a beam of light from an ordinary pocket flashlight through the entire length of the speculum into the vagina. A regular diagnostic light inserted into the speculum may be used, but I prefer a flashlight.

The vagina and cervix are inspected as the speculum progresses forward. The color and character of the mucosa of the vagina and cervix as well as the quantity and character of the secretions present are noted. It is important that the cervix be visualized before the speculum or even a breath of air touches it, because if one touches or manipulates the cervix directly or indirectly, it immediately becomes congested. This state of physiological congestion may be confused with inflammation.

The wall of the vagina should be smooth and pink in color. The normal cervix likewise is pink in color and appears as a symmetrical, smooth, slightly protruding annular fold. However, after one or more fetuses have passed through the cervix, it appears slightly irregular and hypertrophic. The cervical canal is 3 or more inches in length and is obstructed by interdigitating folds of mucosa, usually four in number, which make it appear tortuous. It normally is closed but it is relaxed during estrus and in the presence of disease of the cervix or uterus. Hypertrophied or swollen, protruding cervical folds, or rings as they are frequently termed, usually indicate previous or still existent cervicitis. During pregnancy the cervix is closed and sealed by a firm, tenacious mucous substance termed the cervical seal or plug. This can be both visualized and palpated. The secretions in the vagina should be clear mucus; the quantity present varies with the state of the estrual cycle.

After the vaginal examination the gloved hand is carefully introduced into the rectum. Not only will a thin rubber surgical glove protect the operator from soiling but it will also protect the rectum and vagina of the cow from injury due to sharp finger nails. If the rectum contains fecal matter, it should be evacuated before palpation and examination of the genital tract is attempted. For convenience, I examine the cervix first, then the uterus, fallopian tubes, and ovaries. In aged cows, or if the uterus has been recently gravid or is diseased, the uterus and ligaments may be so relaxed that a satisfactory examination is not possible until a uterine forceps is placed on the cervix through the vagina and the uterus is drawn up toward the pelvis.

A thorough knowledge of the normal anatomy of the genital tract and ample opportunity to practice palpation of these organs is essential for a correct interpretation of findings revealed by examination. Fluid within the uterus may indicate pregnancy or pyometra. It is difficult to differentiate bicoronial pregnancy from pyometritis by palpation of the uterus alone until after the fourth month of gestation. In such cases, the breeding history of the cow and examination of the cervix by means of a vaginal speculum are helpful. If the uterine enlargement is unilateral and a corpus luteum is present in the ovary on the affected side, pregnancy usually is the causative factor.

One occasionally must differentiate between a living fetus and a dead or mummified fetus. In the latter condition there is an absence of fluid within the uterus and pulsation of the uterine arteries is much diminished. If the uterus feels essentially normal but visual examination of the cervix has indicated possible endometritis, I always pass a return-flow uterine catheter through the cervical canal into the uterus and irrigate the latter with a weak aqueous

solution of iodine, using one ounce (30 cc.) of compound solution of iodine in one gallon (3.8 liters) of water. The solution returning through the catheter is observed for the presence of mucus, blood, or pus. Blood may be due to trauma from the catheter, but pus in any form in the return flow indicates disease in the cervix or uterus. If it appears only in the first flow of fluid from the catheter, it probably was picked up by the catheter in the cervical canal, but if it continues to appear, it must have its origin in the uterus. Thus, this procedure has diagnostic as well as therapeutic value. The presence of blood in the return flow of fluid from the uterus may be due to injury from the catheter but it may also indicate that the mucosa of the cervix or uterus is inflamed and easily traumatized.

The fallopian tubes are carefully palpated to detect shortening, thickening, adhesions or other evidence of a preëxistent or still present salpingitis. Because of the natural drainage of the fallopian tubes into the uterus, secondary endometritis and cervicitis are frequently associated with salpingitis. Severe inflammation of the fallopian tubes frequently causes complete permanent obstruction or obliteration of the lumen of the latter. This, however, can not be definitely determined in the living animal.

As the ovaries are palpated, their size and character are noted to determine their physiological state. Normal ovaries are slightly flattened and elongated; they may be 2 centimeters or more in length and, if they are physiologically active, one should be able to palpate an ovisac or one or more corpora lutea in one or both ovaries. Normal ovisacs vary in size and must be differentiated from corpora lutea and true cysts. Normal corpora lutea must likewise be differentiated from so-called persistent corpora lutea. An accurate record of the number, frequency and dates of the estrual periods is helpful in differentiating physiological from pathological changes in the ovaries.

Cystic degeneration of an ovisac, a so-called follicular cyst, usually causes too frequent or continuous estrus, commonly termed nymphomania. Cystic degeneration of a corpus luteum, on the other hand, usually causes infrequent or irregular estrus. Both kinds of cysts may cause abortion in pregnant cows. Ovarian cysts vary greatly in size and they can not be differentiated by palpation alone. For differentiation one must refer to the estrual history of the cow and her general physical condition. This is especially important when the cysts are small and must be differentiated from normal ovisacs and corpora lutea.

Atrophic or nonfunctioning ovaries do not cause specific symptoms other than an absence of estrus. This condition of the ovaries is the only one that can be quite definitely diagnosed by palpation alone. The cause of the absence of physiological activity of the ovaries, however, is difficult to determine.

TREATMENT

Treatment of the various conditions mentioned above must vary with the probable etiology, extent, duration, and severity of the disease present. Therefore, no one method of treatment is applicable to all similar cases.

Cervicitis undoubtedly is the most frequent lesion of the genital tract observed by me. Before deciding on a method of treatment, I try to determine whether the lesion is primary in the cervix or secondary to some other disease. Primary cervicitis, if severe, is treated by irrigation of the cervix and uterus with a dilute solution of iodine. This is repeated once each week, if indicated. If the disease is not too severe, that is, if there is no definite purulent discharge from the cervix, the cervix is first retracted by means of a uterine forceps attached to the margin of the external os. Then it is wiped with a dry swab to remove the mucus and exudate. Then compound solution of iodine (Lugol's solution), tincture of metaphen, or 2 per cent solution of mercurochrome is applied with a gauze swab. This is passed throughout the length of the cervical canal. All protruding, inflamed cervical folds, if present, are first excised, using curved serrated scissors. If the cervix can not be conveniently

drawn back and exposed or if the canal is too constricted to permit swabbing, I inject 2 to 5 cc. of compound solution of iodine directly into the cervical canal through a catheter attached to a glass syringe. The cervix should be examined through a speculum after one week, and treatment repeated if necessary. Simple amputation of protruding cervical folds frequently is striking in its effect.

Endometritis is more frequent than pyometritis. Treatment of the former sometimes includes exercise and changes of diet as well as medication generally and locally. During the summer months, when cows are permitted to graze and exercise liberally, treatment is always more successful than in the winter months. Undoubtedly, certain vitamins in the green food play an important rôle. For medication I irrigate the uterus with a warm aqueous solution of iodine, using 1 ounce of compound solution of iodine in each gallon of water. This solution retains its antiseptic properties under varied conditions.

To irrigate the uterus, I first apply a forceps on the cervix to retract and fix it and make passing of the uterine catheter easier. To do this, the gloved left hand is introduced into the vagina and the jaws of the forceps are directed onto the left side of the cervix, the handles being manipulated by the right hand. When this has been accomplished, the forceps is grasped near the cervix with the left hand and a catheter of suitable diameter is passed through the vagina and cervix into the body of the uterus. The catheter, likewise, is manipulated by the right hand. The left hand is then withdrawn from the vagina and is passed into the rectum to determine the exact situation of the tip of the catheter. It should be definitely located within the uterus before the tube from the irrigating bag is attached to the other end of the catheter. When the right hand has determined that everything is satisfactory, fluid from the irrigating bag is permitted to flow through the catheter into the uterus.

After carefully observing the condition of the first return of fluid from the uterus, I usually place a finger over the opening of the return flow of the catheter to obstruct it and cause distention of the uterus. This may be repeated several times. If the uterus fails to contract and expel the fluid, traction is applied on the uterine forceps to elevate the uterus, and the fluid is then removed by massage. When cervicitis is present and the cervix is relaxed, I usually plan to leave 2 or 3 ounces of the iodine solution in the uterus. This will be discharged after the catheter is removed and make the swabbing of the cervical canal unnecessary. The above treatment should be repeated after one week if indicated.

Cases of pyometritis in which the uterus is distended with purulent fluid occasionally do not respond to irrigation of the uterus alone. I do not attempt to drain and irrigate the uterus in such cases. In many cases it is possible to cause spontaneous contraction of the uterus and expulsion of the fluid by expressing a functioning corpus luteum from an ovary.

Cases presenting nonfunctioning ovaries and atony of the uterus are treated with a commercially prepared estrual hormone and pituitary extract. The former is given in 5- to 10-cc. doses. Twenty-four to 72 hours later, depending on the state of relaxation of the cervix, 5 to 10 cc. of pituitary extract is administered intravenously. This usually causes rather prompt and complete emptying of the uterus. Occasionally, this treatment must be repeated after one or two weeks. As soon as the uterus remains in a contracted state, it may be irrigated and treated as in a case of endometritis. Cases that do not respond satisfactorily to the above treatment frequently are successfully treated by instilling liquid paraffin, oil, and boric acid into the uterus. The quantity will depend on the size of the uterus. Permanent sterility following severe pyometritis is frequent.

It is difficult definitely to diagnose the presence of salpingitis in the living cow. In those cases in which a diagnosis of salpingitis is made, its remote situation makes direct treatment impossible. Endometritis commonly is associated with inflammation of the fallopian tubes. Therefore, I treat suspected cases of salpingitis like cases of

endometritis. If definite lesions can be palpated in one tube only and the ovary on the nonaffected side is not developing ovisacs, one can stimulate it into activity by removing the ovary and tube on the affected side. This operative treatment has proved successful in some cases treated by me.

So-called persistent functioning corpora lutea usually can be expressed by grasping the ovary thorugh the rectal wall and exerting pressure on it. If the corpus luteum has been present for a long period of time, it may be firmly embedded in the ovary. In such cases it sometimes is unsafe to exert sufficient pressure on the ovary through the rectal wall to dislodge the corpus luteum. I then express it by grasping the involved ovary through the vaginal wall. This is accomplished by placing one hand in the vagina and the other in the rectum. The hand in the rectum can readily grasp the ovary, draw it back and place it in the other hand. To guard against hemorrhage from the ovary it is advisable to grasp the ovary and hold it tightly for two or three minutes following expression of the corpus luteum.

The etiology of cystic degeneration of a corpus luteum is different from that occurring in an ovisac. The former is a unilateral, localized, pathological process, while the latter appears to be a manifestation of some disturbance of the endocrine system and may affect one ovary or both ovaries simultaneously.

As regards treatment, both kinds of cysts should be removed. It usually is possible to rupture cysts in the ovaries by grasping the affected ovary through the rectal or vaginal wall and exerting pressure on it. Occasionally, a cyst can not be ruptured in this manner. It then becomes necessary to incise or puncture it through the vaginal wall. This can be done with a knife or an aspirating needle. I prefer the latter.

Merely rupturing a cystic corpus luteum usually is sufficient, but similar treatment of a follicular cyst commonly causes only transient relief. However, apparently permanent cures have been observed following this simple treatment of both kinds of ovarian cysts. Irrigation of the uterus usually is of little benefit in the treatment of cystic disease of the ovaries unless there is associated with it definite metritis. My present method of treating follicular cysts in the ovaries consists of first rupturing the cysts and then administering a commercially prepared extract of corpus luteum. I examine the cow the following week and repeat the treatment if necessary. Recovery usually is rapid.

Nonfunctioning ovaries are difficult to stimulate into activity in some cows. The age of the cow, duration of sterility, diet, environment, and season of the year must all be given due consideration. In the absence of any obvious cause for sterility due to non-function of the ovaries, massage of the ovaries, irrigation and massage of the uterus, and the subcutaneous administration of a commercially prepared estrual hormone have given satisfactory results in some cases.

Oral administration of potassium iodide during the winter months appears to have a tonic effect on some cows. Age, diet and environment generally are the most important factors in sterility from this cause. The importance of diet and environment is illustrated in the following observation: Four cows and a bull were diagnosed as functionally sterile during the late winter months; gross lesions were absent. They were placed together in a pasture early in the summer and all treatment was discontinued. All four cows became pregnant within 90 days.

References

[1]Albrechtsen, D. J.: The Sterility of Cows, Its Causes and Treatment. Alexander Eger, Chicago (1920).

[2]Williams, W. L.: Diseases of the Genital Organs of Domestic Animals. W. L. and W. W. Williams, Ithaca, N. Y. (1921), pp. 856.

The administration of daily doses of 2 to 6 liters of milk is the treatment recommended for bovine coccidiosis in a thesis for a doctorate (Alfort) by R. Fourmont, 1935. Recoveries are generally obtained in five to six days, the author declares. *(Recueil de Médecine Vétérinaire, cxv (March, 1939), p. 309.)*

Comparative Results of Tube and Plate Tests for Bang's Disease on Suspicious Animals*

By CECIL ELDER, D. V. M.

University of Missouri, Columbia, Mo.

IN CONDUCTING blood tests for Bang's disease, one of the problems which is giving us the most concern is the suspicious reaction to the agglutination test. With the hope of throwing some light upon this somewhat perplexing problem, we have carried on experimental work with over 12,000 blood samples, most of which have given suspicious reactions in our routine tube test. The experimental work on this problem will be presented later in this paper. A brief review of the literature produces evidence that other workers also have had some concern about this type of reaction.

The committee on Bang's disease of the United States Live Stock Sanitary Association,[1] a few years ago, recommended that complete agglutination in 1:25 and incomplete in 1:50 be regarded as suspicious reactions.

Donham[2] states that 5 per cent of all animals give suspicious reactions and that this is the group that does not give desired uniformity of results in the various laboratories. These animals are the cause of most of our troubles and differences in results in conducting the agglutination test. He is also of the opinion that it is wrong in principle to compare the results of the plate test with those of the tube test.

Fitch and Donham[3] state, "The chief point of controversy is what constitutes a negative test." Some workers feel that agglutination in 1:25 dilution should be considered as evidence of Bang's disease, while others disregard such reaction. They think that many reactions in the 1:25 dilution only are apparently due to the presence of natural or native agglutinins. They also have found in their work that the two methods of testing do not give identical results with all serums, and state that nearly all variations in the results of the test by either method are confined to tests of serums from the suspicious group of animals. These authors are of the opinion that it is wrong to consider all reactions in 1:25 dilution, or even all incomplete reactions in the 1:50 dilution, as suspicious. They state further, however, that the variations in the results of the two methods are not sufficient to be serious.

Donham and Fitch[4] reported on the different standards of interpretation in different laboratories, and pointed out the great variation in reactions that these laboratories classified as suspicious. It has been suggested by these writers that the standard of the United States Live Stock Sanitary Association regarding the 1:25 dilution be modified, because so many laboratories are not complying with it. On the other hand, Fritz and Barnes[5] are of the opinion that a high percentage of reactions in the 1:25 and 1:50 dilutions, in any degree, especially in a reinfected herd, belong in the positive range and not in the negative range.

Ranney[6] thinks the limits of our so-called suspicious class are altogether too wide. Fitch, Bishop, and Boyd[7] also pointed out that the large percentage of suspects serves to complicate the agglutination test for Bang's disease.

EXPERIMENTAL WORK

We started our work, which has continued over a period of about three years, by comparing results obtained with the tube-method test with those which we found when retesting the same samples by the so-called rapid or plate test. Comparative results have been obtained on a total of 12,006 samples. All of the antigen used in

*Contribution from the department of veterinary science, Missouri Agricultural Experiment Station, journal series No. 574. Presented at the 75th annual meeting of the A. V. M. A., New York City, July 5-9, 1938.

TABLE I—Comparative results on blood samples tested with tube and plate methods at the University of Missouri laboratory. Na

TUBE METHOD RESULTS		PLATE METHOD RESULTS												
TITRE	NUMBER OF SAMPLES	NEG.	P 1:25	+ 1:25	P 1:50	+ 1:50	P 1:100	+ 1:100	P 1:200	+ 1:200	P 1:400	+ 1:400	TOTAL
Neg.	218	183	5	1	21	4	3	1					218
P 1:25	149	37	61	27	20	2	2						149
+ 1:25	300	14	60	128	61	24	12	1					300
P 1:50	1,782	26	15	123	1,081	432	85	19	1				1,782
+ 1:50	4,659	12	7	23	1,242	2,754	530	87	2	1	1		4,659
P 1:100	2,555	8	0	5	186	897	1,087	352	17	3			2,555
+ 1:100	827	2	0	0	4	10	248	327	232	4			827
P 1:200	669	0	0	0	3	1	19	181	356	109			669
+ 1:200	506	1	0	0	0	1	5	6	232	251	10		506
P 1:400	127	0	0	0	0	0	6	0	8	40	50	23	127
+ 1:400	214	0	0	0	1	0	0	0	2	0	73	138	214
Totals	12,006	283	148	307	2,619	4,125	1,997	974	850	408	134	161	12,006

P = Partial or incomplete agglutination.

these tests has been prepared in our laboratory from five strains of organisms according to a technic which has been found satisfactory by us, and which is very similar to those methods of preparation recently published in this journal. In all cases slight traces of agglutination have been ignored, but when there appeared to be as much as 50 per cent or more of the antigen agglutinated, they were classified as partial or incomplete reactions.

We did not expect to get absolute agreement between the two tests, but we thought a study of the comparative results would be worthwhile. In all cases we have been careful to use pipettes which measured accurately in 0.01 cc. We have found it advisable that the dropper for the plate antigen deliver as close to 0.03 cc. as possible. It has been our policy to place about six samples of serum on the plate at a time and to mix the antigen thoroughly between each six samples run, in order to have as little variation as possible in our technic.

The samples used have originated from all kinds of herds and have been collected regardless of herd history or conditions in any particular herd. Invariably, samples have yielded good, clear serum and have been in first-class condition for testing purposes. Although the total number reported contain a few negative and a few positive samples, the greater number, as shown in table I, have been found to give suspicious reactions to the tube method of testing. We have included in this group samples which gave partial and complete reactions in 1:25 and 1:50 dilutions, and a partial reaction only in the 1:100.

It has been the policy in our laboratory to report as reactors complete agglutinations in the 1:100 dilution or above. A few years ago we reported complete agglutination in the 1:25 dilution as a suspicious reaction, but recent experiments have led us to believe that such animals should be reported as negative or non-reactors. It is our opinion that such titres probably have

far more significance in infected herds than in herds which contain only non-reactors or suspects.

The samples used for study have been collected from our routine test. At that time these samples were again set up by the tube method and also tested by the plate method. If the second tube method did not agree with the reaction obtained in the routine test, the sample was discarded and the data not included. When tested with the plate test, should the plate test not agree with the tube-method result, the sample was again tested by the plate method. Here again, the two plate tests had to check with one another or the results were not included in the report. In this way we have attempted to eliminate the human error element as far as possible. In interpreting results it has been our observation that the human element is responsible for a possible variation of one-half dilution, and we have looked upon results that do not vary over one-half of one dilution as being very good agreement, or as near perfect as one could expect when the human element is taken into consideration.

In conducting plate tests we have found an appreciable number to be slow in agglutinating or to give delayed reactions. In all cases we have not read our plate tests until after an interval of eight minutes has elapsed, unless, of course, they have been positive in all dilutions earlier. In a small number of cases by the plate method we have found samples which would not agglutinate in the eight minutes; these have been left upon the plate for a longer time, and when a delayed reaction has occurred, it has been recorded. In the comparative results reported in this paper the final readings of the plate tests have been used in all cases.

Table I gives the result of the comparative tests by the two methods on the 12,006 samples. It will be noted that, on the basis of the tube test, we have included a small number of negative and positive samples, but the large majority are those giving some reaction between negative and the 1:100 dilution. The greater majority of the samples were incomplete or positive in the 1:50 dilution and incomplete in the 1:100 dilution by the tube test. Only a relatively small number of samples have been incomplete or positive in the 1:25 dilution. It will be seen from the table that there is more or less close agreement between the results of the plate and tube tests. From a study of the tabulation one will observe that there is a greater number of suspects by the tube method, and a greater number of reactors by the plate method. A relatively high agreement between the two tests, however, is significant.

A few years ago, it was the policy in this laboratory to classify animals that gave reactions in the 1:25 dilution as suspicious, but recent experimental work carried on by us has caused us to conclude that that was too low and, since then, we report such individuals as negative. Incomplete reactions in the 1:50 dilution have been considered as suspicious.

In a study to determine how much difference there would be in the classification of animals when reported according to the results of the tube or the plate test, we have compiled data, as is shown in tables II and III. It is interesting to note that when one considers an incomplete or partial 1:50 as a suspect, the results are very different from those obtained when the incomplete 1:50 is included with the negatives.

Table II shows the variation and classifications when incomplete reactions in 1:50 dilutions are considered as suspicious. It will be noted here that in a very high percentage of the cases, the same classification was obtained by both methods. For example, in 1,782 samples in which the reaction was partial in the 1:50 dilution, 1,598, or 89.67 per cent, were suspicious by the plate test. In 4,659 samples giving complete agglutination in the 1:50 dilution by the tube method, 4,526, or 97.14 per cent, were suspicious by the plate test. Of 2,555 samples incomplete in the 1:100 dilution, 2,170, or 84.93 per cent, were also classified as suspicious by the plate test. In 827 samples which showed complete agglutination in the 1:100 dilution, only 68 per cent of

TABLE II—Variation in classification when incomplete reactions in 1:50 dilutions are considered as suspicious.

Classed by Tube Reaction	Tube		Classed by Plate Reaction					
			Non-Reactor		Suspicious		Reactor	
			No.	%	No.	%	No.	%
Negative		Neg.	189	86.69	28	12.84	1	0.45
		P 1:25	125	83.89	24	16.10	0	0
		+ 1:25	202	67.33	97	32.33	1	0.33
Suspect		P 1:50	164	9.20	1598	89.67	20	1.12
		+ 1:50	42	0.90	4526	97.14	91	1.95
		P 1:100	13	0.50	2170	84.93	372	14.55
Reactor		+ 1:100	2	0.24	262	31.68	563	68.07
		P 1:200	0	0	23	3.43	646	96.56
		+ 1:200	1	0.20	6	1.18	499	98.61
		P 1:400	0	0	6	4.72	121	95.27
		+ 1:400	0	0	1	0.46	213	99.53

P = Partial or incomplete agglutination.

them were classified as reactors by the plate test. However, when the samples agglutinated higher than 1:100 dilution by the tube method, a greater percentage of them were also reactors by the plate test. Evidence is given here that had we been using the plate test only, instead of the tube test, a larger number of reactors would have been reported. It should be kept in mind that in some cases the results of the plate test caused us to classify some animals as reactors when they would not have been thus classified by the results which we obtained on the tube test. A study of table II may bring out other interesting facts.

Much to our surprise we found somewhat different results by taking the data in table II and tabulating it another way in table III. In the latter table we considered the incomplete 1:50 reaction as negative rather than suspicious. A study of this table will bring out the differences, but it is interesting to note the relatively high percentage of cases which were non-reactors by both tests. There is greater variation, however, in the suspect or suspicious group. For example, in 4,659 samples which gave a complete agglutination in the 1:50 dilution, quite a number were classified as non-reactors by the plate test and only 70.48 per cent could be classed as suspicious. In 2,555 samples which gave partial reactions in 1:100 on the tube test, and classified as suspicious, 77.65 per cent were also suspicious by the plate method. However, 372 suspicious by the tube test, or 14.55 per cent of the total in that group,

TABLE III—Variation in classification when incomplete reactions in 1:50 dilutions are considered as non-reactors.

Tube			Classed by Plate Reaction					
			Non-Reactor		Suspicious		Reactor	
Classed by Tube Reaction			No.	%	No.	%	No.	%
	Negative	Neg.	210	96.33	7	3.21	1	0.45
		P 1:25	145	97.31	4	2.68	0	0
		+ 1:25	263	87.66	36	12.00	1	0.33
		P 1:50	1,245	69.86	517	29.01	20	1.12
	Suspect	+ 1:50	1,284	27.55	3,284	70.48	91	1.95
		P 1:100	199	7.78	1,984	77.65	372	14.55
	Reactor	+ 1:100	6	0.72	258	31.19	563	68.07
		P 1:200	3	0.44	20	2.98	646	96.56
		+ 1:200	1	0.20	6	1.18	499	98.61
		P 1:400	0	0	6	4.72	121	95.27
		+ 1:400	1	0.46	0	0	213	99.53

were classified as reactors by the plate method.

Conclusions

1. Comparative results on 12,006 blood samples, most of which had originally been found suspicious to the tube test, showed a rather close agreement when the results of the tube and plate methods were studied.

2. Comparative results did not show either test to be greatly superior in reducing the number of suspects, but a slightly smaller number of suspicious reactions were obtained by the plate method of testing. If readings in all cases with the plate method had been taken at the end of eight minutes instead of final readings, where delayed or slow reactions were observed, the number of suspects by this method would have been larger.

3. On this particular group of samples studied, a larger number of reactors were found with the plate method than by the tube method of testing.

4. It was found, when comparing the two tests, that there was a great difference if one reported incomplete 1:50 reactions as non-reactors or as suspicious.

5. The difference between results when incomplete 1:50 reactions are classified as non-reactors, as compared with results when they are classified as suspects, may in part account for some of the apparent variations in the agglutination test when reported by various laboratories.

6. This study further illustrates the importance of uniform methods of testing and reporting results.

Acknowledgment

The writer wishes to express his appreciation to Margaret Burke Beezley for her very able assistance in conducting the com-

parative tests and her help in the preparation of the tables.

References

[1]Report, Committee on Bang's Disease, U. S. Live Stock Sanitary Association. Jour. A. V. M. A., lxxxii (1933), n. s. 35 (3), pp. 335-337.

[2]Donham, C. R.: Some of the things we should recognize concerning the agglutination test for Bang's disease. Jour. A. V. M. A., lxxxii (1933), n. s. 35 (3), pp. 327-335.

[3]Fitch, C. P., and Donham, C. R.: A practical interpretation of the scientific evidence on controversial points in the control of Bang's disease. Jour. A. V. M. A., lxxxiv (1934), n. s. 37 (2), pp. 168-183.

[4]Donham, C. R., and Fitch, C. P.: Observations pertaining to standards of interpretation of agglutination titres in the diagnosis of Bang's disease. Jour. A. V. M. A., lxxxix (1936), n. s. 42 (2), pp. 176-186.

[5]Fritz, B. S., and Barnes, M. F.: Bang's disease control in state institution herds. Jour. A. V. M. A., lxxxvii (1935), n. s. 40 (5), pp. 542-558.

[6]Ranney, A. F.: The significance of low titre agglutination. Jour. A. V. M. A., lxxxviii (1936), n. s. 41 (3), pp. 242-249.

[7]Fitch, C. P., Bishop, L. M., and Boyd, W. L.: The significance of suspicious agglutination reactions for Bang's disease. Jour. A. V. M. A., xci (1937), n. s. 44 (1), pp. 22-44.

Classification of the Streptococci of Mastitis*

THE PURPOSE of this note is to call the attention of workers who are interested to a project initiated by one of us (R. B. L.) and outlined in the two letters published below. The necessity for trying to get some orderly arrangement of the streptococci which may be associated with bovine mastitis has long been obvious. This is essential on the grounds of the bacteriological nomenclature itself, and in addition, unless investigators in different parts of the world use the same designations, it is difficult or impossible to make those comparisons which are necessary for a proper understanding of the subject. In consequence scientific progress is impeded.

To cite an example: The term *"Streptococcus mastitidis"* was used in the past to designate more than one kind of mastitis streptococcus. It is now known that there are several kinds of streptococci, recognized by experienced workers, capable of causing different forms of the disease. Moreover, only one of these forms is known to spread easily in a herd. The subject of classification, therefore, has a clear relation to preventive and clinical veterinary medicine.

Briefly, we have decided to ask those who are studying mastitis to communicate with us. Residents of North and South America and Japan should write to Dr. Little, while those of Europe and the British Empire are requested to get in touch with Dr. Minett.

Individuals participating in the project will be requested to reëxamine their cultures by means of a group B standard serum to be issued, and by certain relatively simple cultural and biochemical methods. Mimeographed copies of suggested methods for carrying out these tests and forms for recording the results will be sent out at the same time, to be returned as soon as possible to Princeton or to Camden Town, as the case may be. Cultures giving "atypical" reactions are to be sent for reëxamination to one or the other of these headquarters. Type strains for purposes of comparison will be issued upon request. Later on, the results of the inquiry will be circulated to all concerned and then, if the majority of workers agree, these data will probably be published in summary form, with particular reference to "atypical" strains.

Whether we shall be able to carry out this plan will depend on the prompt coöperation of interested workers.

Two letters relative to the project follow.

The Rockefeller Institute
for Medical Research
Department of Animal and
Plant Pathology
Princeton, N. J.
November 28, 1938

Dr. F. C. Minett, Director
Research Institute in Animal Pathology
Royal Veterinary College
Camden Town, London, N. W. 1

Dear Dr. Minett:

This letter is written in regard to a proposition which interests me very much. It appears to me that some international agreement should be reached as to the cultural classification and

*Submitted by Drs. Ralph B. Little, Princeton, N. J., and F. C. Minett, Camden Town, London, England. Published in the interests of furthering the project herein discussed.

the grouping of streptococci capable of causing mastitis before further serological work has been done. I have found that your simplified grouping of these organisms, as presented in the Report of the 12th International Veterinary Congress, is very useful and serves as a standard for the cultural classification and grouping of the majority of the strains one encounters in mastitis.

Do you think that it would be possible to interest research workers in the British Empire, Europe, Japan, and North and South America to reëxamine strains of streptococci which they have reported as causing mastitis, using the same standard methods, and to list or classify their cultures according to your grouping? With this approach, important subgroups—and even additional new groups—may be recognized. Primarily, and most important of all, it might thus be possible to reach an international agreement concerning the identification and grouping of mastitis streptococci all over the world.

If this proposition seems worthwhile and if you would be willing to contact authors in the British Empire and in Europe, I should be very glad to take up this matter with research workers in the Americas and Japan, in an attempt to obtain this information for you.

Sincerely yours,
Ralph B. Little.

Research Institute in Animal Pathology
Royal Veterinary College
Camden Town
London, N. W. 1
21st Dec. 1938.

Dr. R. B. Little
The Rockefeller Institute for Medical Research
Department of Animal and Plant Pathology
Princeton, N. J., U. S. A.

Dear Dr. Little:

I have your letter of November 28th, 1938. Admittedly, it is sometimes rather difficult to compare the results obtained by various authors who have studied the bacteriology of bovine mastitis in view of differences in their methods. I would therefore most willingly fall in with any attempt to clarify the position with the object, if possible, of securing an agreed classification of mastitis streptococci and I am glad you think a suitable basis might be that advanced by myself in conjunction with A. W. Stableforth and S. J. Edwards. The work would be mainly cultural and biochemical but would also include tests with a standard precipitating serum in order to ascertain whether the strains being examined do or do not belong to Lancefield's serological group B.

However, as you say, the first thing would be to make contact with workers who are interested and to ask them to reëxamine their strains by standard methods and report the results to a central laboratory.

Yours sincerely,
F. C. Minett.

The Parathyroids*

In 1880, the Swedish anatomist, Ivar Sandstroem, described the presence of a gland the size of a hemp seed enclosed in the capsule of the thyroid of a dog. On account of its location, he named it *glandula parathyroidea*. In 1893, Moussu, distinguished bovine pathologist of Alfort, contrary to the opinions of most physiologists insisted that the parathyroids constitute a glandular system that is completely independent of the thyroid system.

Since these memorable disputes, immense progress has been made in the endocrinology of these glands. In 1909, McCallum demonstrated the part these glands play in the metabolism of calcium and, in 1925, Collip prepared an active extract useful in the treatment of hypoparathyroidism. Thus, surgery of these tiny organs was born, and their physiology clarified. They maintain the equilibrium between the insoluble calcium-phosphorus compounds in the skeleton and the soluble compounds of these essential elements in the blood.

As the living body eliminates a certain quantity of calcium and phosphorus every day, a corresponding intake is necessary. If the intake is insufficient, elimination remaining normal, the bones will demineralize to furnish the blood with its needs. On the contrary, if the intake is too rich in these elements, the excretion augments and leaves the blood values unchanged. The parathyroids are the regulating mechanisms of this important function—a function which in animal production can hardly be over-emphasized.

When Roux, in 1903, wrote "Microbes dits Invisible" in the bulletin of the Pasteur Institute, he could name but ten diseases caused by invisible pathogens. At the present time, more than 70 diseases are listed in that index.

*An excerpt from "Endocrinologie parathyroidienne" by M. Pierre, *Rev. de Méd. Vét.*, xc (Dec., 1938), pp. 658-679.

"Finger Prints" for Identifying Horses*

IN A well documented article, lacking no detail, Tagand and Tisseur introduce a novel idea for identifying horses with practically the same precision as finger prints used for the identification of human beings. The article contains 27 pages and 16 revealing illustrations and drawings which leave no doubt as to the merits of the procedure for this purpose.

Fig. 1. Photograph of the palate of a horse. (Tubercle latéral=lateral tubercle; Tubercle médian=median tuberle; Sillon no. 1=first groove; Stries=striae; Raphe médian=median raphe; Crète no. 1=first bar; Sillon no. 2=second groove; Crète no. 2=second bar; Sillon no. 3=third groove; Crète no. 3=third bar; Sillon no. 4=fourth groove; Crète no. 4=fourth bar; Sillon no. 5=fifth groove; Crète no. 5=fifth bar; Coté droit=right side; Coté gauche=left side.) Reproduced from Revue de Médécine Vétérinaire.

Such markings as branding, tatooing, snipping the ears, etc., are not reliable. In animals of great value, where correct identification is indispensable to prevent fraud, a procedure comparable to finger printing may have great value in the husbandry of animals. If the identification of human beings by their finger prints is scientifically precise, the same may be said of palatine prints in domestic animals, since the hard palate has a multiplicity of aspects, sufficiently varied, to become some day a precious means of detecting the identity of animals.

No two palates are alike, and palates are as unchangeable as finger prints, for which

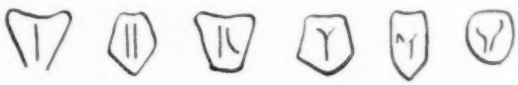

Fig. 2. Drawings showing variation in shapes and markings of the tubercles aligned behind the incisor teeth. Reproduced from Revue de Médecine Vétérinaire.

64,000,000 figures have been established for detecting the identity of criminals. While evidently fewer can be established for the palate, the number of figures presented is sufficiently high to insure against coincidental duplication or successful artificial meddling. The varied arrangement of the bars, grooves and raphe and their relations to one another, not to mention their elevation, depth and direction, form an intricate assemblage that is too complex for med-

Fig. 3. Another picture, showing absence of the median tubercle. Reproduced from Revue de Médecine Vétérinaire.

dling mutations. And certainly, the law of probabilities prevents animals from presenting an identical palatine outline.

The three tubercles located between the

*Tagand and Tisseur. L'identification du cheval au moyen des crètes palatines. Rev. de Méd. Vét., xci (April, 1939), pp. 185-211.

incisors and the first bar (figs. 1 and 3) already serve to complicate the picture. They vary in shape, size and striae contained. But behind them, the bars and grooves and their direction from the raphe, with no two alike in these respects, insure against the likelihood of deceptive similarity. Where there are no distinct median tubercles, the lateral tubercles have their identifying variations.

The bars, which extend in either direction from the raphe, likewise present remarkable variations. Besides, on the general plane are fine lines radiating in the same direction as the bars, close to each other. While there is some irregularity in their presence, the absence or presence of these lines (striae) are deciding factors, since such lines do not change with age.

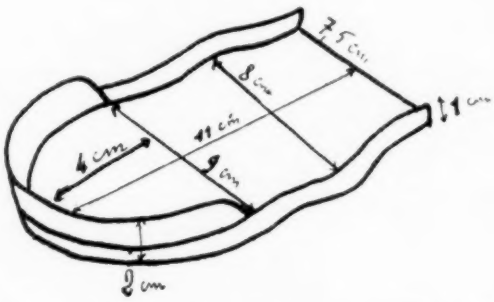

Fig. 4. Holder of the gutta percha. Reproduced from Revue de Médecine Vétérinaire.

The lines are more numerous than the bars, sometimes reaching 100. Their distribution over the palate enables one to distinguish imprints easily.

Photographing the palate by reflecting it with a mirror is a simple and rapid method of registration. Imprints are, however, preferable. These are made with gutta percha held against the palate with a special holder (fig. 4), while hot. The material sold on the market as "temporary stopping" is employed.

Besides giving explicit directions on every detail of the technic, the authors set down rules for classifying the specimens comparable to the registration of finger prints, but naturally much less complex.

Anaphylaxis from Normal Horse Serum in Bovines

Out of 150 bovines treated experimentally in a study of anaphylaxis from parenterally injected foreign proteins, 20 were given the second dose three to 13 weeks later. No symptoms were manifested from the first dose in any of the group. The 20 receiving the second dose, however, developed pronounced symptoms of anaphylactic shock: urticaria, pruritus, lacrimation, salivation, irritation, anxiety, bellowing, cough, dyspnea, movement of the head and limbs, profuse perspiration, edema and cyanosis of the visible mucous membranes, edema of the neck and ears, painful swelling at the site of injection, inappetence, diarrhea, frequent defecation, muscular trembling, drop or elevation of the temperature, accelerated heart and respirations, arrested lactation, and stupor. All of the symptoms, except in one case lasting 48 hours, disappeared on the following day. Six months later, the same injection produced no reaction. *(P. Schramm. Jahres fur Veter. Medizin, June, 1937.)*

Mycologists

In an article on mushrooms by Donald Culross Peattie in *Frontiers*, the reader is warned about the deadly effect of eating unwisely selected species of these luscious fungi, some of which can be differentiated from the edible sort only by experienced mycologists. "Moreover, we have no legal control over the sale of mushrooms, such as exists, for example, in France, where every town has its government-appointed mycologist," says the author.

In France, the "government-appointed mycologists" are the local veterinarians who are given intensive training on this branch of mycology to qualify them for that important sideline of the veterinary service.

Equine purpura hemorrhagica is due to the blocking of the reticulo-endothelial system by the débris of a previous hemolytic infection.—*Contemps and Florio*, 1936.

Myiasis in Domestic Animals*

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THE ATTENTION of veterinarians is frequently directed to wounds or natural body openings in domestic animals that are infested with dipterous larvae. The larvae commonly found in such wounds represent the immature or worm stage of some of our common blowflies, and such an infestation is known as myiasis. A fundamental knowledge of the species of flies involved in external myiasis, the proper treatment of such infestations, and methods of prevention should be of value to the practicing veterinarian.

Flies Producing Myiasis

The most devastating wound invader is the screwworm (*Cochliomyia americana* C. and P.), a true parasite that in nature lives only on the living tissues of warm-blooded animals, including man. The screwworm fly is recognized by its reddish head, metallic blue to bluish green body coloration, and three distinct, dark longitudinal stripes on the dorsum of the thorax. During the season of screwworm-fly activity every break in the continuity of the body surface of warm-blooded animals is susceptible to attack. In 1935 and 1936 the Division of Screwworm Control of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, collected random samples from 2,101 wounds of various animal hosts in the southeastern, middle western, and southwestern sections of the United States. In determining these larvae, Knipling and Rainwater[1] and Brennan[2] found that approximately 90 per cent of these samples consisted of pure cultures of *C. americana*, the true screwworm.

The black blowfly (*Phormia regina* Meig.), also commonly referred to as the fleece- or wool-worm fly, is second in importance as a wound invader. This fly is active particularly during the cooler seasons of the year, and the behavior of the larvae in a wound frequently resembles that of the true screwworm, *C. americana*. Parish and Laake[3] reared adults of this black blowfly from 67 per cent of 4,376 larvae collected from a number of naturally infested wounds in cattle, sheep, and goats in Menard County, Texas, from March 21 to May 26, 1933. Later in the season, when the true screwworm is the predominant species in wound infestations, the black blowfly becomes merely a secondary invader.

Other Wound-Infesting Flies

A fly so closely resembling the true screwworm fly that only a systematist can tell the one from the other is *C. macellaria* F. Unlike the screwworm, however, the larva of this fly develops in decaying animal matter. Consequently, it is also found frequently in old necrotic wounds of living animals. Long wool or mohair saturated with exudates from a myiatic wound is a particularly favorable site for oviposition by this species. The resulting larvae feed in the soiled wool and mohair and from there may migrate either into the wound as secondary invaders or into the surrounding areas, causing a severe skin irritation.

The maggots of the so-called green-bottle flies (Lucilia spp.) and the gray flesh flies (Sarcophaga spp.) are occasionally found in old wounds, where they feed on necrotic tissues. Their presence in old wounds actually may be considered to be beneficial, in view of the fact that the larvae of one of the species of Lucilia have been used extensively, and with remarkable success, in the treatment of osteomyelitis in man.

Myiatic Wounds

During the active fly season, an abrasion or a diseased condition of the skin is the one condition necessary for a case of myia-

*Presented at the annual meeting of the State Veterinary Medical Association of Texas, Dallas, January 24, 1939.

sis. It is needless to go into a detailed description of the life cycle of the myiasis-producing flies because it is common knowledge to every veterinarian that these insects have egg, larval, pupal, and adult stages and that the duration of these four stages is influenced by environmental conditions. The experienced veterinarian will quickly diagnose myiasis by only a casual examination of a wound.

If screwworms are present, there will be a bloody exudate and a familiar obnoxious odor. A closer examination of such a wound will reveal the presence of screwworms crowded closely together in open pockets often, especially in advanced cases, deeper in the flesh or well back in the connective tissue below the skin. As the pointed or head end of the true screwworm is imbedded in the living tissues, only the posterior or blunt end of the worm is exposed. The spiracles, or external respiratory orifices, are located on the blunt posterior end of the larva. When these become covered with a liquid exudate, the larvae are soon compelled to release their hold and come to the surface for air and to seek a more favorable location to feed. Crowding of the larvae in the well drained portions of the wound is, therefore, a natural result.

The larvae of all other species of flies referred to are usually associated with necrotic tissues and are rarely found packed in pockets of the wound. On the contrary, these worms usually will be observed crawling about on the surface of the wound.

Entomologists who are familiar with the problem of myiasis have all noted that the attractiveness of a myiatic wound to the myiasis-producing blowflies, particularly the true screwworm fly, is greatly enhanced as the development of the larvae progresses. Borgstrom[4] recently reported that an undescribed species of bacteria in the Proteus group is always found in wounds infected with true screwworms. Her observations showed, moreover, that when the larvae are 24 to 48 hours old, this species of bacteria is literally swarming in the wound in almost pure culture.

In studying the exudates in myiatic and postmyiatic wounds in guinea pigs, sheep, and goats, Laake[5] and Laake and Smith[6] found that there is a considerable increase in alkalinity in the exudates as the development of the larvae progresses. Furthermore, a positive relationship exists between the maximum attractiveness of a myiatic wound to gravid females of *C. americana* and the period of greatest alkalinity of wound exudates. In a number of tests it was demonstrated that the average number of eggs deposited per wound increased from 14 at a pH of 6.4 to 3,367 at a pH of 7.4.

In approximately 150 artificial infestations of *C. americana* in guinea pigs, the author found that during the postmyiatic period the mean pH of the wound changed from the alkaline to the acid side in the case of all animals that survived, whereas in all that succumbed it remained on the alkaline side. This information should prove to be of considerable value as a guide in the selection of chemicals to be used for wound healing.

TREATMENT OF MYIATIC WOUNDS

Considering its cost, efficiency, and the postmyiatic effects on the wound, nothing has been found that equals commercial benzol as a larvicide or screwworm killer. Although benzol is somewhat slower than some of the other chemicals used by stockmen in killing nearly mature larvae, it has a beneficial styptic effect on the wound. In an open wound benzol is not injurious to living tissues and it leaves no harmful after-effects. On the contrary, commercial benzol changes the pH in an infested wound from the alkaline to the acid side. Not only is this desirable from the standpoint of reducing the attractiveness to blowflies but apparently it promotes a condition favorable for the healing of a wound.

Destructively distilled and dehydrated pine-tar oil (sp. gr. 1.065 to 1.085) should be applied to the wound immediately after all the larvae are killed and the flow of blood has been stopped by the benzol. Pine-tar oil acts as a fly repellent or wound protector. It also aids in healing, owing to the fact that it also acidifies the wound. Bleeding wounds and also necrotic wounds that suppurate continuously are alkaline. As

the alkalinity destroys the desirable properties in pine-tar oil, it is necessary to repeat the applications of pine-tar oil several times to such wounds.

INJURIES PREDISPOSING MYIASIS

In a four-year survey, made by the Bureau of Entomology and Plant Quarantine in four counties in western Texas, the predisposing causes of myiasis were determined. This survey showed that a large portion of the cases of myiasis in domestic animals are due to man-made wounds and to poor live stock management. For example, approximately 70 per cent of 5,045 screwworm cases observed in goats were due to shear cuts. Nearly 90 per cent of 4,304 cases in calves were due to navel, castration, and dehorning wounds. In other classes of live stock similar preventable causes were found to be responsible for a large percentage of the cases of myiasis. These preventable causes should be eliminated by careful management.

In keeping abreast of the newer development in this old problem and applying them in his every-day practice in the field, the veterinarian can contribute greatly to the economic welfare of the live stock industry.

References

[1]Knipling, E. F., and Rainwater, H. T.: Species and incidence of dipterous larvae concerned in wound myiasis. Jour. Parasitol., xxiii (Oct., 1937), 5, pp. 451-455.

[2]Brennan, J. M.: The incidence of the screwworm in wounds for 1936. The Florida Cattleman, Jan. 15, 1937.

[3]Parish, H. E., and Laake, E. W.: Species of Calliphoridae concerned in the production of myiasis in domestic animals, Menard County, Texas. Jour. Parasitol., xxi (Aug., 1935), 4, pp. 264-266.

[4]Borgstrom, Floreine A.: Studies on experimental *Cochliomyia americana* infestations with special reference to the bacterial flora and the development of immunity. Amer. Jour. Trop. Med., xviii (July, 1938), 4, pp. 395-411.

[5]Laake, E. W.: On the hydrogen-ion concentration of myiotic wounds and its relation to the oviposition stimulus in *Cochliomyia americana* C. and P. Manuscript, unpublished, read before the thirty-third annual meeting of the American Association of Tropical Medicine, New Orleans, La., Dec. 2, 1937.

[6]Laake, E. W., and Smith, C. L.: The hydrogen-ion concentration of myiotic wounds in sheep and goats. Jour. Econ. Ent., xxxi (June, 1938), 3, pp. 441-443.

Eye Worms

Verminous ophthalmia due to *Thelazia rhodesi*, Desmaret 1928, occurs frequently in certain regions. The place of predilection is the conjunctiva but the adult parasite and its larvae may be found in adjacent structures: the cornea, the lens, the anterior chamber, the lacrimal gland and duct, the nasal cavity, and the tongue. The evolution of the Thelaziidae is not known. One gm. of thymol in 150 gm. of neutral glycerine, instilled into the eye frequently, is the best treatment. *(Gr. Gr. Iamandi and M. Techu. Abstract, Recueil de Médecine Vétérinaire, cxv (May, 1939), p. 294.)*

Encephalomyelitis Viruses

To the two North American types of equine encephalomyelitis viruses, eastern and western, which abundant cross-protection tests of the past two years have clearly identified as separate entities, a South American type has been added by the recent work of Beck and Wyckoff* of the Lederle Laboratories. Working with brain material obtained from Venezuela, these investigators seem to have proved beyond doubt that three immunologically different viruses of the disease have been recognized in the Western Hemisphere.

The Venezuelan type, as it has been named momentarily, was isolated from portions of brain, taken from horses that had died of encephalomyelitis in that country, which were found to contain a virus more virulent (or perhaps more concentrated) than the North American type.

The newly discovered virus did not protect laboratory animals against the western disease, and cross-immunity tests with the eastern forms showed but an indefinite relationship.

The cattle population of the Dominion of Canada is given as 8,840,500 in the report of the U. S. Live Stock Sanitary Association for 1938. Of these, 3,300,000 are under supervision for tuberculosis eradication.

*Sci., lxxxviii (Dec. 2, 1938), p. 530.

Hyperplastic Endometritis or So-Called Pyometra of the Bitch: Preliminary Report

By JOSEPH DeVITA, V. M. D.
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HYPERPLASTIC endometritis, or so-called pyometra of the bitch, is a part of a symptom complex of the mature female sex apparatus characterized by aberrant hyperplastic changes in the endometrium. This is associated with atypical changes in the ovary and apparent endocrine dysfunction.

INCIDENCE

This condition may be observed at any age following the completion of an estrual cycle but is most frequently seen in dogs over 6 years old. It occurs in virgins as well as in multipara and is the most common cause of sterility in the bitch. It may exist chronically in varying degrees of intensity for several years or it may be abruptly terminated by death of the patient if drainage is not compensatory for the production of intra-uterine accumulations.

CONCOMITANTS

Associated with this condition a number of neuropsychic and physical aberrations may be observed, their presence or absence and the degree in which they may be present probably being determined by the extent of the variation of hormonal balance from average, as related to a particular stage of the estrual cycle, and the time such a condition has existed.

Irregularity of the estrual cycle is frequently noted. The periods between estrus or heat may become longer or shorter. Estrus may exist for weeks or months or the attempt on the part of the body to approach this condition may be so feeble that its presence may be marked by only slight neuropsychic manifestations and unobserved physical signs. The finding of fresh corpora lutea in the ovaries of chronic sufferers of this disease is evidence that maturation of the follicle and ovulation occurred even when estrus was unobserved.

Hypertrophy of the vulva is an extremely frequent concomitant. This enlargement may be variable in the same individual or it may exist with very little change. In size it varies with the intensity of the estrogenic activation, and in texture from a soft edematous consistency to the sclerotic vulva produced by long, continued stimulation. In some old dogs the edema and fibrosis may be so great that the resultant weight and size of this part make for constant bruising and further alteration of its appearance.

A discharge from the vulva is demonstrable in most cases, and even in so-called pyometra, where the cervix appears to be tightly closed, it frequently may be determined by a swab carried well up into the vagina. The color varies from a grayish yellow to a reddish brown. Although putrid in most instances, it sometimes has very little odor. In time the discharge may disappear, to return again after the completion of another cycle.

Distention of the abdomen, simulating pregnancy, accompanies the metestrual form of the disease when the cervix fails as a source of drainage. This physical simulation of pregnancy is striking because it follows estrus.

Breeding failures over a period covering one or more cycles appear in the case histories of some animals, while many have exhibited some mammary development and lactation in the absence of pregnancy with or without previous mating. A very obvious mother instinct is exhibited by some dogs during nonpregnant lactation.

Mammary tumors are common concomitants of this condition, and especially so in the case of older chronic sufferers.

Inguinal hernia may appear in the history, although in some instances only an enlargement of the rings is observed.

Occasionally, owners speak of attacks of

lumbago suffered by these animals. This syndrome may have more significance in this condition than at first appears. A peculiar straddling gait of the hind legs sometimes characterizes older patients.

Skin changes frequently occur in the older, more chronic cases. The skin is dry and inelastic. A sparse, brittle, dry hair coat whose loss is not adequately replaced leads to varying degrees of alopecia. This is noticed especially on the dorsal surface of the body over the sacral region, on the flanks, over the abdomen, the perineum and pudenda. A pigmentation of these regions observed in some animals deserves more study.

The history may present several periods of malaise following one or more estrual cycles lasting up to about six weeks and sometimes associated with skin disease.

Hyperpyrexia is not a constant syndrome, except in such cases where the cervix is failing as a source of drainage.

A variable general state of malaise completes the picture.

OVARIAN PATHOLOGY

Unfortunately, the proper evaluation of the ovarian pathology must await more extensive study of the ovary in the average dog.

In most of the ovaries examined, cystic ovarian follicles were present. These occurred as small, discrete, blister-like formations in some. In others the substance of the ovary appeared lost in multicystic masses.

In five out of 24 cases, ovarian tumors appeared as part of the ovarian pathology. These ranged from fibromata to an epithelioma the size of a large orange. Histological studies may reveal a higher incidence of neoplastic growth.

In the more acute phases of the disease comparatively fresh corpora lutea are always present. In cases in which the pathology present has existed for a long time, these bodies may appear to be undergoing retrogressive changes.

Even in such ovaries in which multicystic formations had left only intercystic trabeculae and islands of ovarian tissue, all stages of follicle growth and regression were observed in those the writer examined. It seems that even in very old dogs with very fibrotic ovaries, some primary follicles may be expected. However, the oldest dog examined was 14 years old and there may be more changes in still older animals. Corpora lutea were found in this old animal.

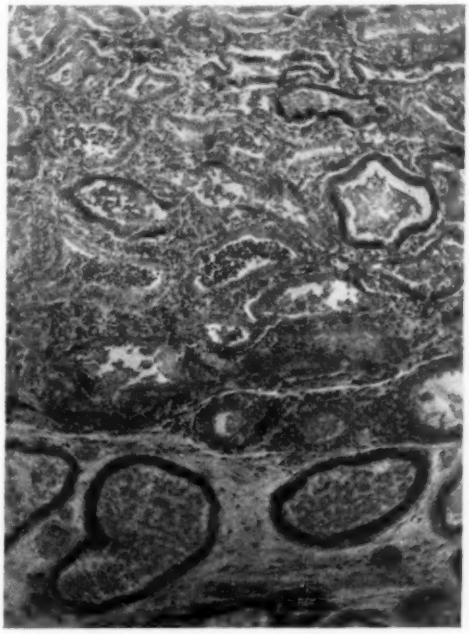

Fig. 1. Typical field of an endometrium from a uterus removed during metestrum. Note the extensive glandular hyperplasia, the extensive leukocytosis, and the leukocyte-filled glands in the basalis (x 102).

Histological studies of the changes found in these ovaries are incomplete and are still in progress.

UTERINE PATHOLOGY

The uterus in this symptom complex changes in appearance according to the degree of hyperplasia and the type and amount of retrogressive change present. Organs removed at a time corresponding to anestrus may be not much larger than the average anestrual organ. On the other hand, if they are removed at a time corresponding to early metestrum, they are greatly increased in length, their diameter is larger and they are more hyperemic and

softer in texture. When distended because of continued failure of cervical drainage, they resemble gravid uteri at term and to accommodate themselves in the distended abdomen will be found plicated into several folds of each horn. These larger uterine abscesses usually reach their height of development at a time near what might have been the latter part of gestation had pregnancy occurred.

Both the length of the interval between ovulation and the removal of the tissues and the amount of free drainage determine the degree of uterine distention in this disease. The manner in which these greatly distended uteri terminate abruptly in a comparatively small cervix is striking. In our experience, endometrial hyperplasia associated with failure of cervical drainage has been a metestrual phenomenon and always has been associated with fresh corpora lutea in the ovaries.

As the interval between ovulation and the removal of the uterus increases, the retrogressive changes and the subsequent fibrosis result in a hardening of the tissues. These changes are also responsible for alterations in color and outline of the organ. Darker areas overlie necrotic portions of the endometrium, while the presence of endometrial cysts or variously situated tumors result in an irregular contour of the peritoneal surface of the wall. Subperitoneal cysts are encountered in the more chronic cases, while in others thick-walled, rounded diverticuli and cyst-like formations project from the uterine wall. When these thick-walled projections are incised, the cut surface resembles a cross-section of the uterine wall and their cavities are filled with a pus-like fluid.

Tumor formations are encountered in some of the uteri removed from older animals. These may be present as single neoplasms or they may be multiple formations. They occur sub-peritoneally, intramurally, or in the endometrium. Occasionally, larger tumors traverse the entire wall and protrude under the peritoneum and into the lumen.

An examination of the endometrium of the atypical metestrual organ will reveal a varying picture to the naked eye. It may appear as a highly injected, thickened tissue, marked by darker areas of necrosis with occasional or generalized cystic formation. In other instances the cystic formation may be so extensive and the fibrotic wall under such tension that the endometrium bulges through the cut wall as a cystic mass.

Histological study of the endometrium typical of this condition made at a time corresponding to well advanced metestrum reveals an extremely complex glandular hyperplasia (fig. 1). In some tissues the epithelial proliferation is so extensive that the entire lumen of the gland appears filled with cells as a result of pseudostratification. Hyperemia, edema and retrogressive changes are marked. An extensive, invasive leukocytosis blankets the entire field.

With the exception of such areas in which these changes have replaced or displaced the glands, no intermediate, comparatively gland-poor zone, such as marks the endometrium of the average metestrual phase of the cycle, is apparent.

The epithelial cells stain poorly and their pycnotic nuclei further attest to their retrogressive state. At the basalis these cells are lower but their height increases toward the lumen. At the lumen this height is further accentuated and they appear bloated. A peculiar shifting of the position of the nuclei of these larger cells from one near the basement membrane to one nearer the lumenal border of the cell is noted. These cells have been described by investigators as a result of activity of the corpus luteum, but Dr. W. U. Gardner has observed them as a result of prolonged, continued high dosage with estrogens in female mice and monkeys. A variable desquamation of the lumenal epithelium is seen. This is very marked in some areas.

Abscesses and cysts are scattered throughout the endometrium.

As the lumen is reached, the generalized leukocytosis increases in intensity. The already narrow mouths of the glands, due in part to the higher epithelium and to the

pressure of interglandular edema and hyperemia, are choked with cell detritus and leukocytes. The deeper portions of the glands are greatly distended and filled with leukocytes and fragments of necrotic cells.

Necrosis, either as that affecting individual cells or areas, is marked. In some, large infarcts may be determined. Fibrosis occurs in varying degrees and in some tissues large fibrotic areas may result from the complete organization of necrotic areas.

Apparently, the tissue response progresses to an extreme glandular hyperplasia associated with edema and hyperemia, then it retrogresses to necrosis, cyst and abscess formation, and fibrosis.

The myometrium shows the effect of long, continued hyperemia, edema and resultant fibrosis. Sometimes we find the endometrial glands have been activated to such an extent that they have grown into the muscle layer. (See figure 2.)

While this writer has not seen endometriosis that actually traversed the endometrium, there is a great possibility that some tissues still to be examined, which are marked by much cystic formation on the peritoneal surface, will prove to be the result of such a condition. In experimental animals this is sometimes so marked that it resembles carcinogenesis.

Although many cervices were not sectioned, those examined showed extensive edema, hyperemia and fibrosis, varying with the pathology present in the uterus.

In the oviduct, changes which parallel those in the uterus were observed.

BACTERIOLOGY

Bacteriological examinations made over a period of several years of intra-uterine contents yielded some interesting data. Seven examinations were made. Two greatly distended, pus-retaining uteri produced material which resulted in no growth on media cultured both aerobically and anaerobically.

Three freely draining organs yielded a variable flora. One produced a pure culture of colon bacillus, another a combination of *Bacillus coli* and a hemolytic streptococcus, while the third combined *Staphylococcus aureus* with *B. coli*. Recently, the contents of two draining metestrual organs yielded no growth on media.

Lesbouyries and Berthelon in 1936 pointed out that the organisms found are those which ordinarily constitute the normal flora of the vaginal and vulvar mucosa. They believe that these organisms become pathogenic only because of favorable predisposing causes.

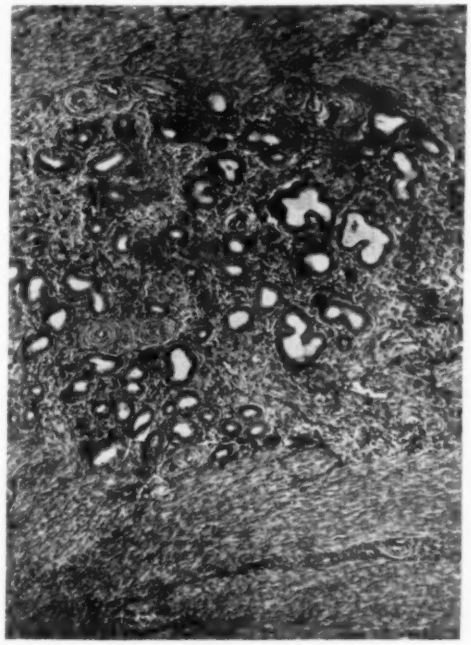

Fig. 2. An island of endometrial tissue in the circular layer of the myometrium (x 102).

ETIOLOGY—EXPERIMENTAL AND CLINICAL DATA

A discussion of the experimental data accumulated on the existing knowledge of the estrual cycle of any species must of necessity begin with mention of the discovery of the estrogens by Drs. Edgar Allen and E. A. Doisy in 1922, and the extraction of the pure substance by Doisy in 1929. This was the start of a new era in the study of the average estrual cycle and was made possible through synthesis of the estrogens, the controlled experiment which is, after all, the only method by which true physiological facts may be garnered.

With the availability of pure extracts

and synthetic estrogens and the fortunately internationalistic nature of science, workers in various parts of the world took up this study.

In 1934, Burrows and Kenneway, working in England, published the first report of an experimentally produced pyometra in female mice.

Fig. 3 case D (114). Endometrium removed at the time of operation. Note extensive leukocytosis, necrosis, and lumenal desquamation (x 102).

In 1935, Lacassagne published a paper which described the endometrial response to prolonged weekly injections of estrone in female mice. He demonstrated a progressive hyperplasia of the uterine glands, a retrogressive shift to an adenocystic condition and, finally, an eventual fibrosis of the uterine wall.

In 1935, in our own country, Witherspoon demonstrated clinically the presence of multiple follicular cysts in the ovaries of 45 per cent of a series of 44 clinical cases of endometrial hyperplasia in women. This percentage represented all on whom laparotomy had been performed and, therefore, all cases of his group in which the ovarian pathology could be described. He pointed out the interrelationship between follicular cysts and endometrial hyperplasia, endometriosis, and fibromatosis in the absence of an inhibiting factor from the corpus luteum. He points to the cystic follicles as the source of estrogens.

In 1935, Zuckerman and Morse produced a cystic endometrial hyperplasia in a castrated adolescent chimpanzee and in an unaltered mangabey by repeated injections of estrin.

In 1936, Gardner, Allen and Strong demonstrated that only female mice which had gone through at least one estrual cycle could be made to develop an endometrial hyperplasia as a result of the prolonged injection of estrogens and first pointed out the rôle of the corpus luteum in the conditioning of the endometrium for the action of estrogens. All of the mature female mice in their series did not develop pyometra, however.

Many others have added to the data existing on this subject.

While most early writers in clinical papers ascribed the etiology to bacterial invasion or to residua and injuries due to the puerperium, of late, workers in this field have published much data to the contrary.

In 1936, Lesbouyries and Berthelon pointed out that oöphorectomy is followed by a cure in from five to 15 days. Subcutaneous injections of gonadotropic hormone, in doses of 50 to 100 physiological units, led to an increase of the discharge of pus by the third day in seven out of eight subjects (three cats and four dogs), and in eight to ten days the uterus had reassumed its normal dimensions, with cessation of purulent discharge. They believe that this hormone permits the ovary to reëstablish its cycle, if the condition is not too serious, allowing the uterus to reobtain the characteristics normally present during anestrus.

They refer to the work of Benesch and Kostner, who used combined gonadotropic hormone and progestin in the treatment of this condition and whose patients were made subject to pregnancy as a result of treatment.

Lesbouyries and Berthelon advanced the following as their theory:

> It is known that the ovary regulates the functional cycle of the uterus, determining notably the opening of the cervix and the suspension of its walls during the puerperium and metestrus. If, in these two instances, under the influence of various causes, the ovarian cycle is arrested, the ovary continues to exert its hormonal action on the uterus (thereafter remaining constantly inert, with open cervix, etc.), bacteria, thanks to the obtaining of these conditions, arrive in contact with the uterine mucosa and determine its inflammation.

An observation made in 1936 may be of interest. The subject was a Cocker Spaniel (case D 114), 13 years old, with a history of endometrial hyperplasia of over three years' standing. There had been several recurring attacks of pyometra following the completion of estrual cycles, or at the time an estrual cycle might have occurred. A large mammary tumor was present.

Under general anesthesia, both ovaries were removed, along with one-half of the right uterine horn for study. One ovary contained three corpora lutea, while the other had four. Both ovaries were cystic. The uterus was typically a hyperplastic organ with much cystic retrogressive change. (See figures 3 and 4.)

Twenty-one days later this animal died as a result of chronic nephritis, probably aggravated by retrogressive change and infection arising in the site of a biopsy made in the tumor. As the photomicrograph of the remnant of the right horn will show (fig. 5), a great improvement in the endometium had occurred. The leukocytic wave had been pushed toward the lumen, the epithelial cells stained more perfectly, and edema and hyperemia had decreased.

From our observations it appears that the clinical cases may be grouped into two classes. In one class we may place cases that are characterized by the metestrual type of pyometra or uterine abscess and those in which this condition, because of the presence or reëstablishment of cervical drainage, goes on into retrogression and some regression, to be activated again at the completion of another cycle.

An example of this type may be found in a Cocker, 13 years old (case D 94). In 1934, when 9 years old, pyometra was first diagnosed and a mammary tumor removed. After dilation of the vaginal fundus, a copious vaginal discharge appeared in about three days. In time this disappeared to give way to the same symptom once or twice a year until 1936, when, following euthanasia, the organs were recovered at autopsy and there was revealed a hyperplastic endometrium with extensive retrogressive cystic change associated with cystic follicle formation in the ovary. Mammary tumors had developed in other breasts.

Fig. 4 (case D 114). Another area of the tissue shown in fig. 3. The swollen cells described in the text are clearly seen (x 102).

An illustration of a reactivated chronic condition may be seen in the case of an old Poodle (case D 124) whose tissues we recovered following euthanasia. Its history was that of many breeding failures, frigidity, and a shortening of the interestrual interval.

This uterus and vagina are very fibrotic

and the uterus presents an extensive cystic formation. In contrast to this underlying chronic condition, the epithelium is made up of the clear, well stained cells that are found following recent estrogenic activation. Edema and hyperemia, as seen in the average proestrus and estrus, are present. Leukocytosis is confined to small, occasional subepithelial desquamating lumenal areas. The bacterial flora was found to consist of *B. coli* and *S. aureus*.

The stratified cornified epithelium of proestrus and estrus characterizes the vaginal mucosa, which also is marked by papillomatosis.

The other class, or ovarian tumor type, is best illustrated by another (case D 56). This animal was presented on June 26, 1934. Its behavior may be of interest. It was a Cocker Spaniel, 6 years old, and had been bred during an estrum on January 4. Fourteen days later she was accidently mated again. She did not prove to be in whelp to either dog, but on the 59th day following the first breeding, again accepted a male. From that time until June, when presented for treatment, she had been in a constant state of nymphomania. Panhysterectomy revealed a chronic fibrotic hyperplastic uterus associated with ovarian tumors.

The skin changes may be due to metabolic disturbances but endocrinological factors also may be responsible for these.

The concomitant mammary tumors so common in the older, more chronic cases deserve much more space than we can give them in a preliminary report. In ten out of eleven instances of mammary adenomatosis in which panhysterectomy or autopsy permitted examination of the uterus, atypical endometrial hyperplasia was observed. The remaining one, though hyperplastic, must await histological examination before it can be classified.

Inguinal hernia, so frequently observed, deserves more study before we can definitely place it as a concomitant.

An interesting brief protocol may help to explain its being included in this symptom complex.

On March 22, 1938, a mongrel female (case D 172), about 7 years of age, was presented for oöphorectomy and the removal of a large mammary tumor. It had been acquired recently and much of its past history was unknown; however, the owner had been told that "it could not have puppies." Examination revealed a large, hard mammary tumor and also a smaller one in another breast. A large inguinal hernia was present on the left side, while on the right side a small omental herniation could be detected. On palpation we felt that the hernia on the left side contained the uterus. The hair was very sparse on the rump and perineum and the skin was very dry.

Through a mid-line abdominal incision, the uterus was drawn out of the hernia and a panhysterectomy performed. No incision was made into the hernia and no attempt at closure of the hernial ring was made. The smaller omental hernia on the right side was not disturbed. We then removed the large mammary tumor.

On examination the uterus presented a typical picture of endometrial hyperplasia associated with cystic retrogression, while the ovaries were cystic and contained what appeared to be rather fresh corpora lutea. All tissues removed were preserved for future study.

On November 23, 1938, this dog was again examined. It was a very active, apparently healthy animal, in good coat. We learned that the coat had improved after the operation and that except for a slight eczema of the rump, during a heavy infestation of fleas in the summer, its condition had remained good. The left groin had the well-tucked-in appearance found in the average dog with no sign of herniation. The right hernia appeared exactly as it did in March, with no apparent discomfort arising from its presence. The small tumor had decreased in size and, although roughly spherical in March, now appeared as a very small, hard, flattened, lenticular body.

The behavior of this small tumor contrasts with that of most mammary tumors. We have observed that such tumors apparently parallel the growth of the endometrium during metestrum, possibly be-

ginning their growth during estrum. They seem to be activated into growth at this time and then go into a quiescent phase, during which they may become sclerotic. At the next estrum, growth seems to be reëstablished and they either increase in size or undergo retrogressive change, in some instances resulting in a complete destruction of the tumor through sloughing. The irregular growth may go on over a period covering several cycles.

In another instance, panhysterectomy resulted in the complete regression of a mammary tumor in three months. This tumor had not as yet become sclerotic, however.

Until the controlled experiment produces this symptom complex in the dog, its etiology must of necessity remain a hypothesis. Estrogen-producing cysts and tumors appear to be the probable source of the inciting factor, when associated with some corpus luteum activity. Experiments on lower animals point to excessive activity of estrogenic substances as the most likely inciting factor.

As remnants of corpora lutea resulting from the previous ovulation may be found at estrum in the ovaries of the average healthy dog, it becomes very difficult to ascribe this disease to the persistence of these bodies. Pyometra is frequently observed early in metestrum, when the corpora lutea are fresh. It seems established that their presence is necessary for the conditioning of the endometrium for this tissue response, but that is as far as our evidence goes.

It is unfortunate that the cost of synthetic extracts of the corpus luteum makes its investigation almost prohibitive. A thorough knowledge of the function of this body is necessary before its rôle in the disease can be understood.

The ovary of the average dog requires much more study before its pathology can be properly evaluated. Indeed, although there have been excellent contributions made toward the understanding of the estrual cycle of this species, there is still much more to be learned. Because of the length of the average interestrual interval of the dog, it lends itself to a study of the gradual changes through which parts of the sex apparatus proceed in the growth and regression which characterize the estrual cycle. Studies of this phenomenon may lead to a better understanding of the cycle, not only in the dog but in species with shorter interestrual intervals.

That the rôle of bacteria in the uterus is that of saprophytes already has been advanced. This belief is strengthened by the fact that a recession of the uterine pathology occurs after oöphorectomy and that there is no specificity of bacterial flora.

The writer is familiar with an experiment, which has been under way for over a year, to determine the effect of estrogens on the uterus of the dog. It may throw some light on the incidence of bacterial invasion of the uterine lumen and the coincidental pathology. The results of these investigations, as far as the bacteriology is concerned, will soon be published elsewhere.

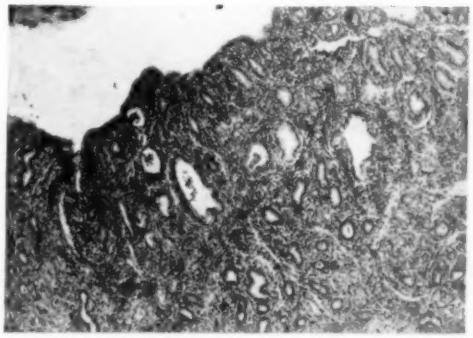

Fig. 5 (case D 114). The endometrium removed 21 days after panhysterectomy. A great improvement of the condition already is apparent. Leukocytosis is confined to the lumenal border, and the epithelial cells stain clearly. This section is taken from the remnant of the same horn from which figs. 3 and 4 were taken (x 75).

A method of early diagnosis would be of great value, and the writer is collecting vaginal smears with the hope that these may throw some light on the incidence of this disease.

A thorough understanding of the symptom complex discussed here has great humane and economic importance. Not only would it be of value from a standpoint of the suffering of so many animals, but with

the great amount of money invested in canine breeding, it assumes economic importance.

This writer hopes to contribute more to the understanding of this symptom complex in future publications.

This preliminary report is drawn from the tissues and histories of 24 cases, in five of which histological studies were made. More histories and tissues already have been added to the series under study.

TREATMENT

Until diagnostic methods become more accurate and it is possible to separate the cases associated with cystic ovarian follicle formation from those in which ovarian tumors play a part, panhysterectomy is the treatment of choice. In practice simple oöphorectomy is not justified until we have learned more about this disease.

At present we are experimenting with the serum of pregnant mares in the treatment of this disease.

ACKNOWLEDGMENTS

The writer gratefully acknowledges the assistance of Professor Edgar Allen, head of the department of anatomy at the Yale Medical School, and especially that of Associate Professor W. U. Gardner of the same department. In extending to him the use of the excellent facilities of their laboratory and allowing him to be in contact with the work they are doing, they have made this work possible. To Doctor Gardner especially, who has been both collaborator and patient teacher, he is deeply grateful and appreciative. The photomicrography illustrating this paper is also part of his contribution.

The writer also wishes to express his appreciation to Dr. Caspar G. Burn, at present assistant professor of pathology at the Long Island College of Medicine, for valuable assistance in bacteriological examinations of uterine contents while he was assistant professor of pathology at the Yale Medical School.

He also wishes to acknowledge the coöperation of Dr. Louis Weinstein of the department of immunology, who is collaborating in bacteriological and immunological studies.

He is appreciative of the assistance of many of his clients who have been and are at present coöperating in the collection of vaginal smears and in other studies.

He wishes to express his gratitude to Dr. H. Preston Hoskins of Evanston, Ill., formerly secretary of the American Veterinary Medical Association, for valuable assistance in bibliography.

Bone Tuberculosis in Dogs

A disease manifested by a more or less symmetrical hypertrophy of the leg bones of dogs has been described under various names. At the beginning, it involves the distal end of the shafts, and old cases extend into the articulations. Because it was frequently found to be associated with organic tuberculosis (generally pulmonary), the osseous manifestation was believed to be the reaction of a tuberculous process, notwithstanding that the specific organism, present in the affected organs, could not be isolated in the lesioned bones. The observations of Leriche and Policard attributed these osteopathic reactions to circulatory troubles due to chronic cachectic affections (tumors, cancer, as well as tuberculosis leading to edema of the declivitous regions, particularly the periosteum, which thus becomes "ossifiable"). The diaphysis enlarges, and the framework rarefies as the calcareous elements are used up by the periosteum to form the osteophytes. (*From a doctorate thesis abstracted in Revue de Médecine Vétérinaire, xci (March, 1939), p. 172).*

Finely powdered animal charcoal (0.1μ to 0.01μ) in a 2 per cent aqueous solution given in 2 to 6 cc. doses intravenously, is a quick-acting antidote for barbituric derivatives (St. Jacques, Belgium, 1935) as well as a useful treatment for bacillary infections (Ménétrel, France, 1935). The mode of action is not known.

POULTRY

This is the month of the Seventh World's Poultry Congress—an extremely important event not only for the poultry industry but for the veterinary profession as well. The growing interest on the part of veterinarians in poultry practice is revealed in the increasing number of scientific papers on various topics of this field. The following articles have been assembled as a special department for this issue to focus the attention of veterinarians everywhere on the significance of the profession's membership in the Congress and the avenue which it opens for greater representation in the industry.

The Respiratory System of the Chicken*

By W. M. McLEOD, D.V.M., and R. P. WAGERS, M.S., D.V.M.

Department of Anatomy and Physiology
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THE GROWING interest in poultry practice makes it desirable to devote a little time to the anatomy of the fowl. Few veterinary anatomists have time or inclination to devote to this subject. Rather than a general discussion, we have chosen to present a more detailed paper on one system. Since the respiratory apparatus is probably more universally misunderstood than the balance of the bird, it is our choice.

The bird differs so radically in structure from the mammal that only a general outline of mammalian anatomy is applicable. Detailed histology of the respiratory system of the bird is almost entirely lacking. The major part of this paper was written with the dissected specimen before us. We have not made an extensive review of the literature and only where some significant statement is used, is direct reference to the author indicated. The illustrations are all original. The number used is not adequate. We make no claims of infallibility and will welcome constructive criticism of this material.

THE NASAL CAVITY

The nasal cavity is conical in the chicken and turkey. The long, flat bill of the duck and goose modifies its external appearance but causes only minor variations in the cavity itself. The skeleton of the cavity is very deficient when compared with that of the mammal. The nostrils, situated about half way between the eye and the point of the beak, are oval in outline and are bounded by the premaxillary and nasal bones. They are much larger in the skeleton, since the dorsal and posterior portion is occupied by a fold of integument in the entire bird. The floor of the cavity, remarkable for the bony tissue it does not possess, is formed by the palatine processes of the premaxillae and maxillae and the long, slender palatine bones. The right and left sides are separated by a long, rather wide space which reaches from the body of the premaxilla to the vomer bone. In the entire state it is considerably narrowed by the abundant palatine salivary tissue. This space represents the posterior nares or choanae. When viewed from below, it appears as a single space but is completely divided in its deeper part by the nasal septum. The choanae involve the posterior half of the roof of the mouth as well as the anterior part of the pharynx.

The cavity proper is rather small and is divided in the chicken and turkey by a complete septum. The septum is perforated opposite the nostrils by a septal foramen in the duck and goose. A median section of the head and adjacent part of the

*Presented at the 75th annual meeting of the A. V. M. A., New York City, July 5-9, 1938.

neck provides a favorable specimen for the examination of the nasal cavity and pharynx (fig. 1). Three turbinate bones are present. They are conveniently designated as dorsal, middle, and ventral. The ventral turbinate is situated opposite the nostril. The middle turbinate is the largest and corresponds to the dorsal turbinate of the mammal. It is horizontal in direction and reaches to the posterior end of the cavity. The dorsal turbinate is the smallest of the three and is not coiled. It projects into the posterior part of the cavity above the middle turbinate as a blister-like enlargement.

The relatively large nasal orifice of the lacrimal duct is found on the lateral wall

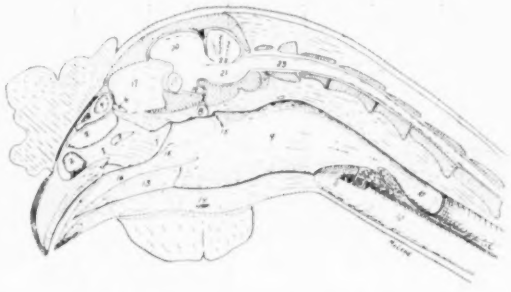

Fig. 1. Median section of the head and adjacent part of the neck. (1. Nasal cavity. 2. Ventral turbinate. 3. Middle turbinate. 4. Dorsal turbinate. 5. Orifice of lacrimal duct. 6. Opening of the infraorbital sinus. 7. Lateral wall of the choana. 8. Entrance to the Eustachian tubes. 9. Pharynx. 10. Esophagus. 11. Cavity of the larynx. 12. Trachea. 13. Dorsal surface of the tongue. 14. Hyoid bone. 15. Rows of papillae. 16. Oral cavity. 17. Medial wall of the orbit. 18. Optic nerve. 19. Pituitary body. 20. Cerebrum. 21. Medulla oblongata. 22. Cerebellum. 23. Spinal cord.)

of the cavity below the middle turbinate and slightly above and behind the anterior extremity of the choana. The opening is slit-like with its medial border in the form of a free fold. Contrary to popular opinion, the lacrimal duct does not open into the mouth, although a probe introduced into the canal from its orbital opening passes through the choana. At the posterior end of the middle turbinate is the opening into the infraorbital sinus. This is a narrow slit-like opening with its long axis almost horizontal. It is guarded in front and below by a fold of mucous membrane derived from the middle turbinate.

THE INFRAORBITAL SINUS

The infraorbital sinus (figs. 2 and 3) is an extensive and complicated diverticulum extending outward and downward from the nasal cavity. It extends forward into the angle formed by the nasal and maxillary bones and posteriorly ventral to the eyeball. The cavity of the sinus may be divided into anterior, middle and posterior parts. The anterior part extends anterior to the orbital region into the roof of the mouth. The posterior part passes backward ventral to the eyeball and curves upward. This posterior part is partially divided into medial and lateral portions by a somewhat longitudinal septum. Laterally it reaches the skin from a point above the angle of the mouth to a point below the lateral (posterior) canthus of the eyelids. Its medial extent is limited by the interorbital septum. The middle part is adjacent to the anterior part of the eyeball. The opening leads upward and medially from the highest part of the sinus to open into the posterior part of the nasal cavity close to the nasal septum.

Normally the posterior and middle parts of the sinus are small. When invaded by pus-producing organisms, because of its rather unyielding relations, except laterally, it protrudes outward in a remarkable and startling manner. In the duck and goose the sinus is larger in its anterior part and its opening is on a lower level and somewhat larger than that of the chicken.

THE PHARYNX

A definite anterior limit for the pharynx is difficult to locate, as the soft palate as seen in the mammal is entirely absent. Hence, the oral cavity is directly continuous with that of the pharynx. It is customary to regard the two rows of papillae, one crossing the roof of the mouth and the other the base of the tongue, as the dividing line. The cavity of the pharynx is long. Its posterior extent reaches to the level of the third or fourth cervical vertebrae. Many writers consider the pharynx

Fig. 2. Cross sections of the head. (1. Infraorbital sinus. 2. Nasal cavity. 3. Ventral turbinate. 4. Middle turbinate. 5. Dorsal turbinate. 6. Oral cavity. 7. Choanae. 8. Orifice of the infraorbital sinus. 9. Cavity of the pharynx. 10. Cavity of the eyeball. 11. Nasolacrimal duct. 12. Tongue.)

to be limited posteriorly, as it is anteriorly, by two rows of papillae, one opposite the base of the cranium and the other at the posterior edge of the larynx. This arrangement would give the cavity a very short roof and leave a considerable portion dorsally, without any name whatever.

We see no reason why the posterior limit should not include the aditus esophagi as it does in the mammal. The cavity widens rather abruptly as it leaves the mouth and then narrows more gradually as it approaches the entrance of the esophagus. The roof presents, anteriorly, the posterior part of the choanae, which ends rather abruptly. Behind the choanae is a median fissure, the deeper part of which leads into the common opening of the Eustachian tubes. Lateral to the fissure are scattered papillae and posterior to it a definite row which points backward. The balance of the roof and the lateral walls are marked by variable longitudinal folds but are otherwise without important features. The anterior part of the floor is depressed and relatively narrow. Posteriorly it widens and is largely occupied by an oval elevation on which the aditus laryngis is situated.

THE LARYNX

The larynx consists of two parts separated by the length of the trachea. The separate parts are known as the anterior, cranial, or respiratory larynx, and the posterior, caudal, or thoracic larynx. The functions of the larynx are likewise divided. The respiratory larynx is a valvular apparatus which regulates the volume of air respired and prevents the aspiration of

foreign material. The posterior larynx is the organ of voice and is, therefore, frequently called the syrinx.

The respiratory larynx is similar in position and, except for the absence of the epiglottis and vocal cords, is similar in structure to that of the mammal. Its cartilaginous frame has been modified by altered shape and fusion of some of its cartilages and the complete absence of the epiglottic cartilage. The cricoid and thyroid cartilages appear to have fused, forming a structure resembling a sugar scoop open posteriorly. The thyroid laminae are fused ventrally, forming a complete floor.

Fig. 3. Cross section of the head; continuation of fig. 2. (1. Infraorbital sinus. 2. Septum of number 1. 3. Cavity of the eyeball. 4. Fissure leading to the common opening of the Eustachian tubes. 5. Cavity of the pharynx. 6. Cavity of the larynx. 7. Optic nerve.)

Of the cricoid cartilage, one can recognize the dorsal arch and right and left lateral parts. The ventral arch seems to have fused with the thyroid laminae. The arytenoid cartilages are represented by a pair of spike-like bars directed forward from the dorsal arch of the cricoid with which they articulate. They are freely movable and form the basis for the "lips" of the aditus laryngis. A slight fold of mucosa at the anterior end of the aditus is sometimes regarded as a rudimentary epiglottis. The aditus laryngis is a long, narrow slit in the median plane which, when dilated, becomes diamond-shaped. The laryngeal muscles are concerned with regulating the size of the aditus. The syrinx will be described in its proper sequence.

THE TRACHEA

The trachea has a diameter of about one-quarter of an inch and a length of about six inches in the smaller birds (Leghorn). Its length is considerably less than that of the neck and thoracic vertebrae to a point opposite its bifurcation, since it cuts across the contours of the neck rather than following them. It lies in the median plane for approximately the first two inches of its course, but at a variable distance from the concavity of the neck.

As the neck becomes convex ventrally, the trachea passes to the right, becoming lateral to the second curve of the cervical "S." It continues on the right side of the neck, ventral to the esophagus, to the thoracic inlet, where it again becomes ventral to the cervical musculature and almost median in position. The crop lies to the right of the trachea just anterior to the thoracic inlet and crowds it medially against the cervical muscles. Within the thorax, the trachea is related dorsally to the esophagus, which crosses obliquely from the right to the left side and ventrally to the anterior thoracic (clavicular) air sac. It divides just above the base of the heart but at some distance from the hilus of the lungs.

The tracheal rings are complete, numerous, and somewhat ossified. The length of the trachea is strengthened by a narrow muscular band, trachealis muscle, along each side. Just anterior to the posterior larynx these muscles leave the trachea, become cylindrical, pass backward and outward to insert on the costal process of the sternum. The latter muscles, sterno-trachealis, are given credit for aiding in the production of voice. In the duck and goose the tracheal rings undergo a progressive ossification. Thus, one may distinguish between young and old individuals.

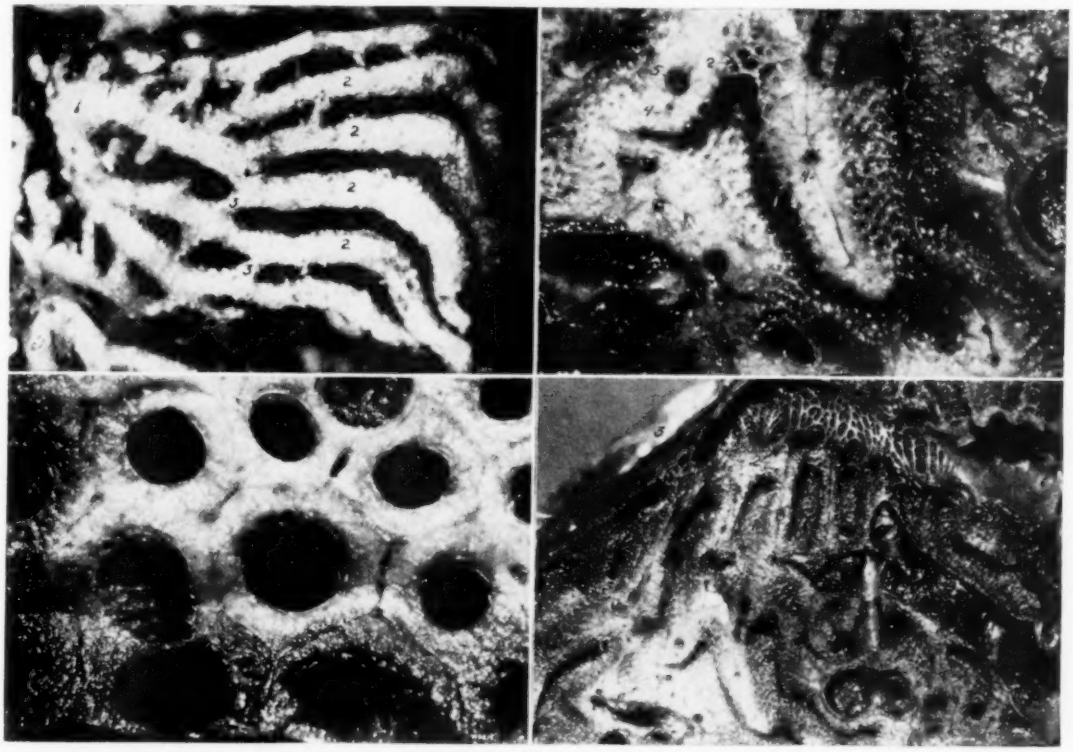

Fig. 4 (upper left). Injected lung showing bronchi—dorsal view (approx. x 2.5). (1. Secondary bronchus. 2. Tertiary bronchi. 3. Anastomoses between bronchi.)

Fig. 5 (upper right). Longitudinal section of tertiary bronchi (approx. x 7). (1. Lumen. 2. Openings to air capillaries. 3. Pulmonary vessel. 4. Membrane between bronchi containing vessels (?). 5. Pulmonary vessel.)

Fig. 6 (lower left). Cross section of tertiary bronchi. Note the hexagonal outline. The lumina are black (approx. x 7).

Fig. 7 (lower right). Oblique section of tertiary bronchi (approx. x 2.5). (1. Lumen. 2. Air capillaries. 3. Edge of lung.)

THE SYRINX

The syrinx is located in the thoracic cavity at the bifurcation of the trachea. The last three-eighths of an inch of the latter is flattened and its wall almost membranous. The terminal ring of the trachea is bony. Posterior to this bony ring the membranous wall of the trachea is strengthened by three or four cartilagenous bars on either side. At the bifurcation of the trachea is a strong, prismatic, bony bar reaching from the dorsal to the ventral wall. The medial wall of each bronchus has its origin from the posterior-lateral border of the bar, while the anterior edge is continued by a semilunar fold of mucous membrane.

The first part of the lateral bronchial wall is membranous. If the trachea and bronchus are pushed toward each other, a second semilunar fold appears at the origin of the bronchus. These folds represent the vocal cords. They are separated by a pointed oval opening, the rima glottidis. The arrangement is identical at the origin of both bronchi. If the bronchus and trachea are stretched, the lateral fold tends to disappear and the rima becomes larger. Really, the vocal apparatus is paired, except that the medial fold serves both sides. A remarkable spherical bony box complicates the structure of the syrinx of the male duck and goose. This is called the bulla tympaniformis.

THE THORAX

The thoracic cavity is a cone-shaped structure bounded by the first six thoracic vertebrae dorsally, the ribs, except the last one, No. 7, laterally and sternum ventrally. The entrance is formed by the furcula on the sides and ventrally. Behind the furcula are the coracoid bones. Dorsally we find

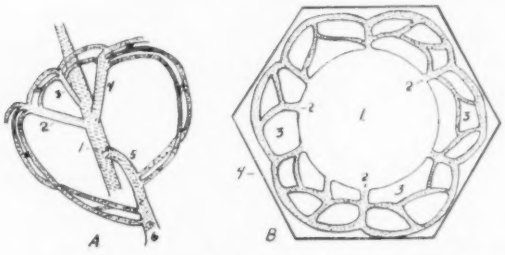

Fig. 8. A. Scheme of the bronchial systems of the right lung. The view is anterio-lateral and somewhat dorsal. 1. Primary (meso) bronchus. 2. Dorsolateral bronchus. 3. Dorsal bronchus. 4. Dorsomedial bronchus. 5. Ventral bronchus. 6. Origin of the thoraco-cervical air sac.)

B. Cross-section of a tertiary (para) bronchus—diagrammatic.

(1. Bronchial lumen. 2. Air capillaries. 3. Intercapillary spaces. 4. Interbronchial membrane.)

the first thoracic vertebra and laterally a space, since the free extremities of the clavicle and coracoid bones do not reach the vertebrae. The first and second ribs do not reach the sternum and the last one joins, by its ventral end, the rib preceding it.

The ribs, except the first and second, consist of two segments. The ventral segment represents the ossified costal cartilage of the mammal. This part articulates with the sternum by a diarthrodial joint consisting of medial and lateral parts separated by a notch. On all but the first and last two ribs there is a hook-like uncinate process directed upward and backward from the upper or vertebral portion of the rib to be firmly attached to the succeeding rib. The duck and goose each have nine pairs of ribs but the last two pairs appear to be modified transverse processes of the lumbar vertebrae. The intercostal spaces are occupied by the intercostal muscles. Posteriorly the cavity is separated from that of the abdomen by a thin, tendinous diaphragm.

THE DIAPHRAGM

Considerable confusion exists concerning the diaphragm. Many say it is absent. Actually, there are two of these necessary structures, the thoraco-abdominal and the pulmonary. The former is a very thin, tendinous sheet separating the thoracic and abdominal cavities. It is attached to the sternum, the ventral part of the seventh rib, almost the entire length of the sixth rib and to the sixth thoracic vertebrae. The heart and pericardium deeply indent the lower part and the pericardium is so firmly adherent to it that separation of the two structures is almost impossible. In addition to the openings found in the mammal are a pair on each side near the middle of the sixth rib for the origin of the abdominal air sacs. The dorsal part is fused with the posterior part of the pulmonary diaphragm.

The pulmonary diaphragm is a horizontal sheet dividing the thoracic cavity into dorsal and ventral parts. It has a narrow, fleshy belly attaching to the ribs and the remainder is tendinous. Medially it is attached to the ventral crest of the thoracic vertebrae and, laterally, to the ribs just ventral to the junction of the vertebral and ventral parts and to the free extremities of the first and second ribs. Posteriorly it is attached to the posterior border of the sixth rib. It is perforated by openings for the origin of the air sacs and for the bronchi and pulmonary vessels.

THORACIC CONTENT

The dorsal part of the cavity contains the lungs and pleurae. Ellenberger and Baum state that the pleura is absent. Others make a variety of statements but we have yet to find a clear description of this serous membrane. We see, macroscopically, a thin membrane covering the lungs and lining the cavity. This resembles the pleura. But, if the lung is carefully lifted from the diaphragm, a tissue resembling areolar connective tissue is seen connecting the two structures. A similar connection is present between the lungs and the costal wall. This tissue is so delicate that it may easily be overlooked.

If the third, fourth and fifth ribs are disarticulated at the junction of the vertebral and ventral parts and this part of the thoracic wall carefully removed, some of the connecting tissue will be seen. Again, careful lifting of the lungs from the diaphragm exposes more of the connection. Incidently, opening the thoracic cavity, as described above, exposes the muscular part of the pulmonary diaphragm.

The ventral part of the thoracic cavity contains the heart and pericardium, various large vessels, portions of the trachea, bronchi and esophagus, the anterior and posterior thoracic air sacs, and two endocrine glands—the thyroid and parathyroid.

THE LUNGS

The relatively small, light-red lungs occupy the dorsal part of the thoracic cavity extending from the first to the sixth ribs. The lateral border is at the junction of the vertebral and ventral parts of the third and fourth ribs and gradually approaches the vertebral extremity of the first and sixth ribs. They are completely separated by the large ventral spine (crest) of the thoracic vertebrae. Each presents three surfaces, three borders, and two extremities.

The costal or dorsal surface, the most extensive, is strongly convex transversely and is marked by four grooves formed by the ribs. The anterior groove, formed by the second rib, is shallow. The others, impressions of the third, fourth and fifth ribs, are deep, especially at the dorsal border. The ventral surface, second in point of size, is slightly convex in both directions. It faces almost directly downward and is related to the pulmonary diaphragm.

The hilus is located just anterior to the middle of this surface and at some distance from the median plane of the body.* At the posterior margin of the hilus is an opening leading from the lung into the posterior thoracic air sac. The flat medial surface is related to the ventral spine of the thoracic vertebrae. Its upper half is marked by three, sometimes four, circular openings surmounted by a fissure. These openings lead into the costal grooves on the dorsal surface of the lung.

The lateral border is thin and convex. Opposite the second rib it presents several openings leading into the recurrent bronchi from the anterior thoracic air sac. The dorsal border fits into the angle formed by the large, plate-like transverse process and the ventral spine of the thoracic vertebrae. It is thick, rounded, and marked by a shallow anterior and three deep grooves formed by the neck of the ribs. The ventral border, at the junction of the medial and ventral surfaces, is convex in its length and without interesting features.

The anterior extremity is a blunt point which fills the space bounded by the first rib, first thoracic vertebrae, and the origin of the longus colli muscle. The opening

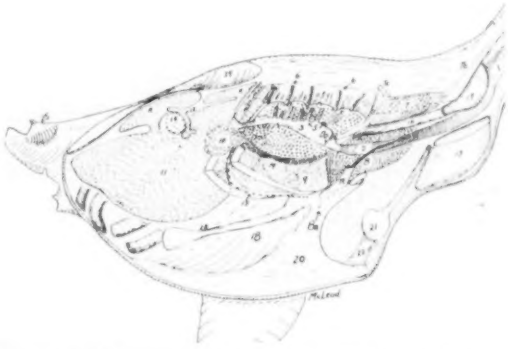

Fig. 9. Relations of the air sacs to the lung and body wall. (1. Trachea. 2. Syrinx. 3. Primary bronchus. 4. Ventral secondary bronchi. 5. Dorso-medial secondary bronchi. 6. Costal grooves on the lungs. 7. Thoraco-cervical air sac. 7a. Process of 7 to the thoracic vertebrae. 7b. Cervical extension of 7. 8. Anterior thoracic air sac. 8a. Sternal process of 8. 9. Posterior thoracic air sac. 10. Small abdominal air sac. 11. Great abdominal air sac. 12. Femoral diverticulum of 11. 13. Position of acetabulum. R-R. Suprarenal diverticula of 11. 14. Pulmonary diaphragm (muscular part just above 14). 15. Attachment of thoraco-abdominal diaghragm — dotted line. 16. Esophagus. 17. Crop. 18. Liver. 19. Costal process of sternum—sterno-trachealis muscle leading from 19 to the trachea. 20. Keel. 21. Hypocleidium. 22. Claviculo-sternal ligament. 23. Medial branch of the posterio-lateral sternal process. 24. Anterior part of the ilium. 25. Glandula uropygii.)

leading to the thoraco-cervical air sac is found on this extremity. The posterior extremity follows the direction of the sixth rib. It is thick medially, becoming thin laterally where it joins the lateral border. The openings for the two abdominal air sacs and for the recurrent bronchi from

these sacs are located on the lateral part of the posterior extremity.

STRUCTURE OF THE LUNG

The structure of the lung differs radically from that of the mammal. There is no evidence of lobulation, no alveoli, and no tree-like branching of the bronchus. The bird's lung stands in a class by itself. A few definitions are in order. Almost every investigator of this structure has proposed several new terms.

The primary bronchus (mesobronchus) arises by bifurcation of the trachea. Secondary bronchi arise from the primary bronchus. Many of these are rather large but a few of the third degree in diameter and some of the intermediate size arise from the primary bronchus and are therefore secondary in the point of origin. Tertiary bronchi (parabronchi) arise from the secondary bronchi. The latter are the smallest of the bronchi and anastomose freely. Various studies of the lung and bronchi are illustrated in figures 4 to 9.

The picture is further complicated by the secondary bronchi being arranged in groups or systems. Five groups can be recognized. (1) The ventro-bronchial group (entobronchi) consists of the first four secondary bronchi and are distributed to the ventral surface of the lung. They also communicate with the cervical and thoracic air sacs. (2) Dorso-medial bronchi (ectobronchi) arise behind the former and pass to the dorso-medial part of the lung. (3) Dorso-lateral bronchi pass toward the lateral border of the lung. (4) Dorsal bronchi are distributed in the area between 2 and 3. (5) Finally, there are the recurrent bronchi, so named since they originate from the air sacs and grow into the lung. Also, the air current in these is from the air sac into the lung. They were recognized as a separate group through embryological study (Locy and Larsell).

The primary bronchi result from bifurcation of the trachea some distance from the hilus of the lung. The extra pulmonary portion is about five-eighths of an inch long and is provided with three-fourth cartilage rings on the lateral side, the medial wall being largely membranous. The bronchus enters the ventral surface of the lung just anterior to its middle. The pulmonary artery is antero-lateral and the large single pulmonary vein postero-medial to the bronchus.

The intrapulmonary part of the primary bronchus passes obliquely through the lung, inclining toward the dorsal surface, to open on the lateral part of the posterior extremity. Its termination leads into the great abdominal air sac. The first one-half inch, from which the ventro-bronchi arise, has a diameter equal to that of the extra-pulmonary portion. Posterior to this part it widens abruptly into the vestibule, with about 100 per cent increase in diameter. In the balance of its course through the lung its diameter gradually diminishes as the secondary bronchi are given off. Its terminal diameter is less than one-eighth of an inch.

The four ventro-bronchi (entobronchi) arise in a row from the ventro-medial surface of the primary bronchus just after it enters the lung. They all pass to the ventral surface of the lung where they appear as rather wide, thin-walled tubes. Numerous tertiary (para) bronchi arise from the ventro-bronchi. Many of these are directed into the substance of the lung, while others are superficial. The superficial groups pass toward the borders of the ventral surface of the lung where they turn onto the dorsal and medial surfaces to anastomose with the tertiary bronchi of the dorsal systems.

The first ventro-bronchus passes anteriorly to open into the cervical air sac. The second is directed laterally, and the third and fourth posteriorly. The third has a ventral branch leading into the posterior thoracic air sac, which is readily found on the ventral surface of the lung just medial to the pulmonary vein.

Six dorso-medial (ecto) bronchi arise from the dorsal surface of the bronchus behind the ventro-bronchi. These pass directly to the surface of the lung and divide into several tertiary bronchi. The latter pass medially, turn downward on the medial surface of the lung and anastomose with

the ventro-bronchi. Numerous tertiary bronchi arise at right angles from the dorso-bronchi as they pass to the surface of the lung.

Approximately five dorso-lateral bronchi arise from the lateral wall of the primary bronchus. Their terminal tertiary bronchi reach the lateral border of the lung and anastomose with the ventro-bronchial system. These bronchi are smaller than those of the first two groups. One of them reaches the junction of the posterior extremity and lateral border of the lung to open into the small abdominal air sac.

The dorsal group of bronchi, 30 or more in number, are directed toward the costal surface of the lung into the area between the dorso-medial and the dorso-lateral group. They vary in size but have a diameter similar to that of the parabronchi. Two of the larger ones are situated on either side of the most anterior one of the dorso-medial bronchi. The terminal branches of this system anastomose with the adjacent dorso-medial and dorso-lateral systems.

Three groups of recurrent bronchi are recognized from a background of embryology. Two of these arise from the abdominal air sacs and are directed inward and forward to anastomose with the systems of the dorsal surface of the lung. The third group comes from the lateral part of the anterior thoracic air sac. They join the ventro-bronchial system at the lateral border of the lung opposite the second rib.

Many of the tertiary bronchi are superficial and parallel to the surface of the lung. The anastomoses of the dorso-medial and dorso-lateral groups with the ventral system are readily seen without dissection. The branches of the medial and lateral, and indirectly those of the middle dorsal bronchi, connect with those of the ventral group and thus again with the primary bronchus.

The tertiary bronchi are the smallest of the bronchi. As stated above, they arise from the secondary bronchi and permeate all parts of the lung. They anastomose freely and neither end blindly nor in alveoli. Thin-walled tubes, air capillaries, arise from the tertiary bronchi. They anastomose freely with others from the same tertiary bronchus but not with those of adjacent bronchi. In the spaces of the air-capillary net are the blood capillaries. A parabronchus with its air and blood capillaries forms a hexagonal column of almost perfect geometrical design. The boundary of an individual hexagon appears to contain branches of the pulmonary vessels. The air capillaries provide for the gas exchange and are thus physiologically comparable to the alveoli of the mammal. May we repeat that there are no blind ends in the bronchial system of the bird. The air passages are continuous and have numerous anastomoses. The air can, and probably does, circulate through these passages in contrast to the periodic in and out flow of the mammal. In this connection the air sacs are important reservoirs of inspiration and expiration, as will be discussed later.

AIR SACS

The air sacs (figs. 10-12) are mucoserous structures which develop as outgrowths from the primary and secondary bronchi. They are frequently referred to as extrapulmonary continuations of the bronchi. The mucous lining is continuous with that of the bronchi. The serous covering is acquired as the sacs grow out into the body cavities. The walls are so thin that they are almost transparent. They are poorly supplied with blood vessels. These two features suggest that the sacs play a passive part in respiration. A variety of terms are used in naming the sacs. Each form of terminology has its good points but none seem to be entirely logical. Therefore, we suggest and have and will use some modifications (table I).

The nine air sacs may be divided into two groups both anatomically and physiologically. The thoracic group consists of two paired and one single sac. These assist in expiration. The abdominal group consists of large and small paired sacs. These assist in inspiration.

The thoraco-cervical (cervical) paired sacs are located at the junction of the cervical and thoracic vertebrae. The main

part of the sac is rather small, but it is easily opened by an incision between the free extremities of the coracoid and the clavicular bones and the base of the neck. The roots of the brachial plexus cross its superficial surface. The communication with the anterior ventro-bronchus is ventral to the first rib. Ventrally, the sac is related, on the level with the esophagus, with the anterior thoracic sac.

parts which later fused to form the single sac of the adult bird. It communicates with each bronchus just as the latter pierces the diaphragm and with the ventro-bronchial system by recurrent bronchi on the lateral border of the lung opposite the second rib. Dorsally it is related to the esophagus and thoraco-cervical sacs and pulmonary diaphragm, anteriorly to the coracoid bones, ventrally to the body of the

Fig. 10 (left). Air sacs injected with celluloid mass. (1. Anterior thoracic air sac. 2. Posterior thoracic air sac. 3. Small abdominal air sac. 4. Great abdominal air sac. 5. Posterior suprarenal extension of 4. 6. Anterior suprarenal extension of 4. 7. Liver. 8. Lung. 9. Kidney.)

Fig. 11 (center) Air sacs injected with celluloid mass. (1. Axillary extension of the anterior thoracic air sac. 2. Pectoral diverticulum of 1. 3. Humeral diverticulum of 1. 4. Humerus—longitudinal section; cavity filled with mass. 5. Femoral extension of the great abdominal air sac. 6. Femur. 7. Great pectoral muscle reflected upward.)

Fig. 12 (right). Air sacs injected with celluloid mass. The lung and casts of the small abdominal and posterior thoracic air sacs have been removed. (1. Anterior thoracic air sac. 2a. Cervical extension of 2. 2b. Extension to the thoracic vertebrae from 2. 3. Great abdominal air sac. 4. Impression formed by the cast of the small abdominal air sac. 5. Posterior suprarenal extension of 3. 6. Anterior suprarenal extension of 3. 7. Cavity of the posterior thoracic air sac; the cast has been removed. 8. Liver. 9. Kidney.)

Dorsal, anterior and posterior prolongations are present. The dorsal prolongation passes upward and backward dorsal to the shelf-like transverse process of the thoracic vertebrae and supplies air to these bones. The anterior diverticulum extends through the canalis transversarious to the third or fourth cervical vertebrae. It connects with the interior of the cervical vertebrae posterior to the third. This diverticulum is small in diameter and so curved as to render it difficult to follow, except in injected specimens. The posterior diverticulum passes backward into the thoracic cavity ventral to the ventral spine of the thoracic vertebrae to the level of the fourth vertebrae. The right and left sacs communicate through an oval opening situated anterior to the first rib and ventral to the longus colli muscles.

The single anterior thoracic (clavicular) sac occupies the antero-ventral part of the thorax. It was originally composed of four

sternum, posteriorly to the pericardium and posterior thoracic air sacs, and laterally to the sternal ribs and intercostal muscles. Its posterior limit, at the junction with the anterior thoracic sac, crosses the pericardium almost vertically. It sends a process into the body and keel of the sternum.

Some authors state that the sternal ribs and the coracoid bones are pneumatized from this sac, a feature which, thus far, we have not been able to demonstrate. The terminal part of the trachea, extra-pulmonary portion of the bronchi, sterno-trachealis muscles, brachiocephalic arteries and the anterior vena cavae appear to cross the cavity of this sac.

The axillary diverticulum is a large pouch leading from the main sac behind the coracoid bone into the axillary region, where it is covered by the large, superficial pectoral muscle. The pouch has three divisions: (1) Pectoral, which extends for-

ward between the large and small pectoral muscles close to the shoulder joint; (2) humeral, which leads to the pneumatic fossa of the humerus and from there into the cavity of the bone; and (3) subscapular, leading backward between the subscapular muscle and the thoracic wall. The humerus appears to be the most completely pneumatized bone in the skeleton.

The posterior thoracic paired sacs are located between the pulmonary and thoracoabdominal diaphragms and are limited laterally by the sternal ribs. Each has the form of an asymmetrical triangular pyramid. The communication is with the third ventro-bronchus, which pierces the pulmonary diaphragm just medial to the pulmonary veins.

reach almost to the abdominal floor and dorsally to the roof of the pelvis.

Anterior and posterior suprarenal and femoral diverticula are present. The suprarenal diverticula enter the space between the kidney and ilium, replacing the perirenal fat of the mammal. The posterior suprarenal extension supplies air to the interior of the adjacent part of the ilium. The femoral diverticulum passes outward anterior to the acetabulum to form a semicircular pouch embracing the anterior part of the hip joint. It does not pneumatize the femur. The lateral relations are the lateral abdominal wall and the small abdominal air sac. The medial relation of the right sac is to various parts of the intestine. On the left side the medial relations

TABLE I—Nomenclature of air sacs (fowl).

	PAIRED	SINGLE	PAIRED	PAIRED	PAIRED
Bradley	Cervical	Clavicular axillary	Cranial thoracic	Caudal thoracic	Abdominal
Kaupp	Cervical	Anterior thoracic	Anterior diaphragmatic	Posterior diaphragmatic	Abdominal
Locy and Larsell	Cervical	Anterior thoracic	Anterior intermediate	Posterior intermediate	Abdominal
Proposed	Thoraco-cervical	Anterior thoracic	Posterior thoracic	Lesser abdominal	Greater abdominal

The small abdominal paired sacs are located near the middle part of the lateral abdominal wall. They are flat, almost circular sacs with a diameter of about one inch. Their relations are laterally with the abdominal wall and medially with the great abdominal sac. Each communicates with the most posterior part of a lateral secondary bronchus near the lateral part of the posterior extremity of the lung. Each also gives origin to several recurrent bronchi.

The great abdominal paired sacs are the most extensive of the air sacs. The left is considerably the larger due to a medial pouch not found on the right sac. These sacs extend the entire length of the abdominal cavity dorsally. Ventrally they are principally the muscular stomach and the terminal part of the duodenal loop. From the antero-medial wall of the left sac an extensive pouch extends medially over the proventriculus and ventral to the ovary to reach the right surface of the muscular stomach. Both abdominal sacs usually can be demonstrated, when the ventral wall of the abdomen is removed, by pulling the lateral walls outward and thus dilating the sacs.

Largely on an anatomical basis a few statements on respiration are offered. These are suggestions rather than proved facts. Van Heelsbergen states that the air of the abdominal sacs is rich in oxygen, while that of the thoracic sacs is deficient in oxygen but rich in carbon dioxide. On inspiration much air is drawn into the ab-

dominal air sacs. Meanwhile expiration is taking place into the thoracic air sacs.

During expiration the air passes from the thoracic sacs through the ventro-bronchial system to the primary bronchi and to the trachea. At the same time, the oxygen-rich air from the abdominal air sacs is entering the dorso-bronchial system through the recurrent bronchi from these sacs. It thus appears that air circulates, perhaps continuously, through the air passages of the lungs. While respiration is the most important function of the air sacs, others are recognized. They make the body lighter and, due to their position, keep the center of gravity low. They are also important in the regulation of the body temperature. In some birds (pouter pigeon, for example) they are structures of vanity.

Bibliography

Locy, W. A., and Larsell, O.: The embryology of the bird's lung. Amer. Jour. Anat., xix and xx.

van Heelsbergen, T.: Handbuch der Geflugelkrankheiten und der Geflugelzucht.

Ellenberger, W., and Baum, H.: Handbuch der Vergleichenden anatomie der haustiere.

Bradley, O. C.: The Structure of the Fowl.

Kaupp, B. F.: The Anatomy of the Domestic Fowl.

Chauveau, A.: The Comparative Anatomy of the Domestic Animals (Fleming's trans.).

Discussion

CHAIRMAN BEAUDETTE: You have heard Dr. Wager's paper. Are there any questions or comments?

DR. EARL SUNDERVILLE: Did I understand the doctor to say there were no connections between the abdominal air sacs and the femur or that he had not established it?

DR. WAGERS: So far, we have been unable to demonstrate any communication.

DR. SUNDERVILLE: In that case, what was the termination of the projection of the sac in the slide that was pointing toward the femur?

DR. WAGERS: That was just a blind terminal. It is stated, however, that there is a communication. We have been unable to find that.

DR. T. O. BOOTH: I did quite a lot of work on these air cells several years ago. I think this young man deserves a great deal of credit for what he has done. But, here is something that might enlighten you and the young man that has given this talk.

I find the nine sacs which I have designated as, three—cervical; two—thoracic; two—diaphragmatic; and two—cloatic. They can be inflated very readily, and I can demonstrate by inflating those different air sacs that they will communicate with all the bones of the body. The three anterior communicate with the cervical vertebrae, the two lateral will communicate with the humerus, and upon inflating those with a colored fluid after you are through, you can crack those bones and strike the material from the mediallary capillary of the bones.

The middle also communicates with the sternal. The posterior cloacal will communicate with the femur. If you will open those bones throughout, they will be communicated.

There are a lot of boys here that can verify that, and who have helped me do some of this work. They will bear this boy out, and it may be helpful in your work.

Female Hormones and Growth in Chicks and Pullets

The administration of female hormones over long periods (22-63 weeks) in variable doses markedly affects the growth of chicks. Ovarian extract, folliculin, and estrin were used on chicks, beginning at the age of six weeks. The growth and development of chicks given small doses of female hormone in the form of ovarian extract was tardy while large doses of pure hormone favored growth. The ovaries of those receiving small doses in the form of extract were small and their oviducts short and thin, while these organs in those receiving large doses were well developed —in fact, better than normal ovaries, and the comb, wattles, and plumage were favorably influenced.

The period of laying was retarded in those receiving the small doses. In the group receiving large doses of ovarian extract mixed with the mash, development was much better.

The conclusion drawn from the experiment was that the administration of female hormone to chicks during a long period stimulates growth and the development of the sexual organs. In small doses and in a form not pure, however, hormones employed in the manner mentioned retard growth and sexual development. *(Tomas Vacek, École des Hautes Études Vétérinaire, Brno. Abstract from Annales de Médecine Vétérinaire lxxxii (Feb., 1937), p. 78.)*

Vomiting has two main causes: (1) Irritation of the stomach wall and (2) increased intracranial pressure. The one is a reflex, the other a direct stimulus to the vomiting center located in the medulla.

Preliminary Notes on a Hitherto Undescribed Poultry Disease

By Y. S. GRASOVSKY, M.R.C.V.S.

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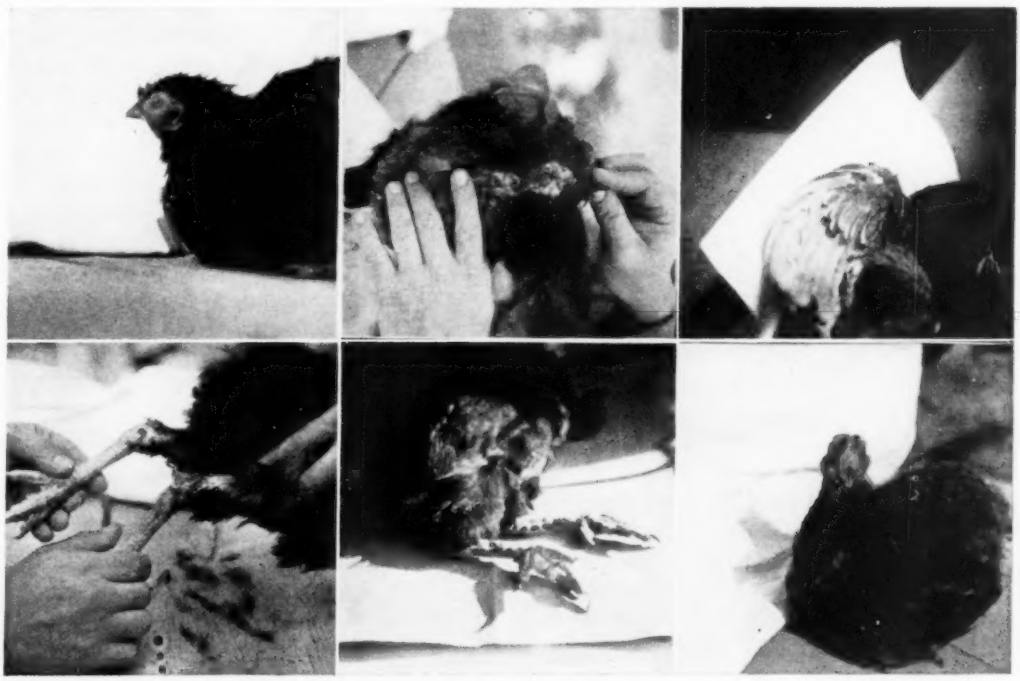
A DISEASE largely affecting young Rhode Island Red pullets and occasionally mature hens of the same breed came to the writer's notice in April of 1937 on one of the finest poultry farms in Palestine. Later in the year, three additional flocks were reported to be similarly affected.

The source of the stock in all four outbreaks was one or the other of the government poultry stations, yet, interestingly, this condition was not observed at either of these places.



Figs. 1-6 (left to right). 1. A diseased bird showing characteristic swelling of the affected parts. 2. Scab development around the vent. 3. Under surface of the wings of an affected chicken, showing scab formation. 4. Typical scab formation on the shanks. 5. Feet of an affected bird. 6. Characteristic loss of comb and wattles.

Symptoms: There are heavy scabs on different parts of the body, especially on the head and face. The affected parts swell, sometimes to such an extent as to close the eyes (fig. 1). Scabs also develop around the vent (fig. 2), on the under surface of the wings (fig. 3), on the shanks (fig. 4) and on the feet (fig. 5). A common result of the head lesions is the falling off of the comb and wattles (fig. 6).

The scabs around the vent or those on the wings increased in size gradually and became rigid. If the chickens survived, the scabs slowly loosened (fig. 7), and in the course of three to four weeks, dropped off.

The affected birds lost appetite and looked depressed. Pronounced emaciation preceded death in about 50 per cent of the cases.

Internal lesions were not constant. In a few cases abscesses were found in the spleen and, more rarely, on the liver. A more frequent postmortem finding was a swelling of the proventriculus with a puru-

lent condition of the follicles, which in a number of cases were hemorrhagic or ulcerated. On the average, the period of sickness lasted about a month, the bird succumbing at the end of that time.

Not a single case was seen or reported in male birds. Although running in the same yards with birds of other breeds and having the same feed and care as the others,

Fig. 7. This bird survived the disease. Note how the scabs have begun to loosen.

the disease was observed only in Rhode Island Reds.

Histological examination, conducted by Dr. Caspper, was limited primarily to parts of the scabs and the skin of the head, although the kidneys, ovaries, spleen and liver were also examined.

The pathological changes of the scabs and skin were about the same; the difference was one of degree only. It is believed that the primary changes are a marked congestion. The vessels were filled tightly with blood. Hemorrhages were present. There was also proliferation of the epithelium into the underlying stratum and a very strong parakeratosis, with deposits of lipoid substances.

In places the proliferation of the epithelium looked like a tumor. Where the lesions were more intensive, there was great hemorrhage into the superficial layers of the epithelium in such a manner that these layers, with the deposit of lipoid substances, became raised and soon necrosed. Under the epithelium there was a nonspecific granulation tissue, rich in cells, with many eosinophiles, fatty granular cells, and a deposit of lipoid substances. In portions of the epithelium and the underlying stratum there was complete necrosis.

Examination of the ovary revealed a very strong infiltration of eosinophiles. There was also an inflammatory infiltration in the liver with many eosinophiles around the branches of the portal vein. The kidneys and spleen showed marked congestion. In the cases examined, no bacteria, parasitic fungi or other parasites were found.

At first, the condition was believed to be the same as that described by Kaupp, Dearstyne, Wilfong and Greene[1] as infectious, purulent entero-proventriculitis. After careful study and comparison of the symptoms of these two conditions, however, well defined differences were noted. Infectious purulent entero-proventriculitis is a filtrable virus disease characterized by paralysis, inclination to sneeze, circumscribed external abscesses, internal abscesses, and high susceptibility of males. In the condition which we have observed the cause is unknown (transmission experiments having failed to produce the disease); no paralysis was observed; there were no signs of sneezing; scabs were extensive; internal abscesses were found only occasionally; and cases in males were not observed. In addition, the external appearance was normal in the former disease, whereas in the latter, scabs were present in all cases.

Reference

[1]Kaupp, B. F., Dearstyne, R. S., Wilfong, H. S., and Greene, L. M.: Infectious purulent entero-proventriculitis of fowls. Tech. Bul. No. 31, N. Car. State Coll. Agr.

Thyroidectomized chickens, according to Lanz, show nothing except the laying of smaller eggs (5 grams instead of 50 grams) and but eight to ten eggs per season instead of 110 to 120. The shell is thin and may be absent. Hatched, the embryos show anomalies of development even to the point of anecephalia.

About 36 nations and 36 states will participate in the World's Poultry Congress. Up to April 1, 1939, approximately 100,000 memberships had been purchased.—*Poultry Tribune.*

Failure of Wheat Germ Oil to Prevent Lymphomatosis in Chickens

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In 1938 Butler and Warren[1] and Butler, Warren and Hammersland[2] reported that wheat germ oil had been used successfully in the treatment and prevention of fowl leukemia, or leukosis. The writers explained that various leukemic and paralytic conditions had been combined for the purpose of their study under the general term of "fowl leukosis." Since their study was stated to involve about 1,000 paralyzed birds, many of the cases were apparently of the type known as neurolymphomatosis. The effective agent in the wheat germ oil was presumed to be vitamin E. It was assumed, therefore, that the rations used did not meet the nutritional requirements of the stock for this vitamin.

Adamstone[3] reported in 1936 that he had produced lymphoblastomata in young chicks on a diet deficient in vitamin E. In that report and in previous ones by Adamstone and Card[4, 5] chickens fed diets composed of common feedstuffs developed symptoms attributable to vitamin E deficiency only after destruction by chemical means of the vitamin in the diet.

Recently, a number of reports on the use of wheat germ oil have been published. Cole[6] obtained no beneficial effects in paralyzed birds by feeding or injecting wheat germ oil. Barber[7] obtained some partial or temporary recoveries in paralyzed birds fed wheat germ oil, but the duration of the disease was not appreciably affected by the oil and the birds showed lymphomatous lesions on postmortem examination. Jungherr[8] found that no beneficial effect on the course of the disease was produced by injecting or feeding wheat germ oil. A popular article by Norris[9] summarized the published and unpublished work on this subject at a number of experiment stations in which the prevailing evidence indicated an inability of wheat germ oil to control or prevent lymphomatosis.

Plan of Experiment

Stock: The present experiment, which was initiated with Single Comb White Leghorns hatched in March and April of 1938, was an attempt to prevent lymphomatosis by a feeding program starting with the day-old chick. As reported by Taylor and Lerner,[10] the University of California has developed two selected lines of chickens, with high and low incidences of neoplastic diseases, respectively. The neoplastic lesions found in these lines were almost exclusively some type of lymphomatosis. Stock hatched from these lines, from reciprocal crosses between these lines, and from other lines not selected with respect to neoplastic mortality, were divided approximately equally, by alternating consecutive wing-band numbers, into control and wheat germ oil lots. This method of division gave approximately the same distribution of ancestry, sexes, and ages of the chicks in the two lots. A large proportion of the cockerels were culled and sold as broilers; hence, no accurate account can be made of the males. All females which lived were saved and none was culled or sold. Since no neoplasms occurred before the age of ten weeks, the number of pullets alive at that time was taken as the basis for calculation of the percentage of incidence of lymphomatosis.

Rations: The mash fed the control lot consisted of the following parts: Ground yellow corn, 53; ground wheat, 10; red wheat bran, 15; sardine fish meal, 9.5; dried skim milk, 5; dehydrated alfalfa meal, 5; limestone, 1.5; bone meal, 0.5; salt, 0.5; and fortified sardine oil (400D), 0.25. The mash fed the wheat germ oil lots was the same as that given the controls, except for the addition of 0.25 parts of wheat germ

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oil.* The rations were mixed twice weekly. Both lots received only mash for the first three weeks. Then, scratch grain was added in increasing amounts until, at twelve weeks of age, grain and mash were fed in equal proportions. The scratch grain was composed of two parts of cracked yellow corn and one part of wheat. Green feed was given each day in the form of lawn clippings or kale to both lots, and oyster shell and water were available *ad libitum*. From twelve weeks to the end of the experiment, no change was made in feeding conditions.

Autopsy Procedure†: Dead birds were brought to the laboratory daily except Sunday and were examined for gross lesions, particular care being taken to observe all of the larger nerve trunks. In cases where there was any reason to suspect neoplastic conditions, tissues for microscopic examination were taken from nerves, bone marrow, spleen, liver, kidneys, and other organs or parts that might be involved. The final diagnosis was always made on the basis of the combined microscopic and macroscopic findings.

RESULTS

Nature of Lymphomatous Lesions: The lesions of lymphomatosis were divided into three types, depending upon the tissue involved. These were neurolymphomatosis, in which the peripheral or central nervous system was involved; iritis, in which the iris was the affected part; and visceral lymphomatosis, in which the other tissues and organs of the body were involved. No lesions were found that could have been interpreted as erythroleukosis or myeloid leukosis.

Neurolymphomatosis was characterized by an early displacement and final replacement of parts of the peripheral or central nervous system by neoplastic lymphoid cells. In mild cases the nerve fibers appeared merely to be displaced laterally by the invading cells, but close examination of these cases by means of the polarizing microscope usually revealed myelin sheath degeneration. Such nerves were opaque, exhibiting a pearl-gray color, and were so slightly enlarged that macroscopic recognition of them was very difficult. The most reliable criterion for macroscopic detection of the early cases of peripheral nerve involvement was the disappearance of the striations. Final diagnosis of the early cases, however, was based upon microscopic examination. In the more advanced stages of neurolymphomatosis the normal fibers were entirely replaced by the invading cells and the affected nerves were easily recognized by the increased size and grayish color. Some cases which showed definite paralysis of the legs had very mild lymphomatous lesions of the sciatic nerve, but myelin sheath degeneration could easily be demonstrated.

Iritis, produced by lymphomatosis, was characterized by the accumulation of neoplastic lymphoid cells in the iris. The gray iris observed in the living bird was apparently produced by the displacement and final replacement of the pigment of the iris by the invading cells.

In the majority of the cases of visceral lymphomatosis the liver, spleen, kidney and ovary were involved, but lesions of other tissues were also encountered. In the milder cases, masses of neoplastic cells were found immediately surrounding blood vessels, while in the more severe ones the invading cells penetrated deeply into the parenchyma of the organ involved, and in some cases entirely replaced the functional tissue. The former were difficult to recognize macroscopically, since they were not necessarily accompanied by an increased volume or changed color and texture of the organ in question. The latter, however, were easily recognized by increased size, changed color and texture and, frequently, by the presence of tumorous nodules on the surface of the affected organ. In most instances it was not difficult to distinguish the lymphomatous process by microscopic examination. Occasionally, however, cases were found in which a perivascular accumulation of lymphocytes might have been mistaken for lymphomatosis. These borderline cases were not classified as lymphomatous.

*The oil for this experiment was donated by the Archer-Daniels-Midland Company, through the courtesy of August J. Pacini.

†Assistance in this work was furnished by the personnel of W.P.A. project O. P. No. 665-08-3-29, unit B-7.

TABLE I—Incidence of lymphomatosis according to line and ration.

LINE	RATION	NUMBER OF PULLETS AT TEN WEEKS OF AGE	NUMBER DYING OF LYMPHOMATOSIS TO TEN MONTHS OF AGE	PERCENTAGE OF LYMPHOMATOSIS	
				BY RATIONS	BY LINES
High neoplastic	Control	148	25	16.89	16.55
	Wheat germ oil	136	22	16.18	
Low neoplastic	Control	324	9	2.78	3.09
	Wheat germ oil	291	10	3.44	
Cross high male x low female	Control	26	3	11.54	9.38
	Wheat germ oil	38	3	7.89	
Cross low male x high female	Control	18	1	5.56	2.78
	Wheat germ oil	18	0	0.00	
Other lines not selected with respect to neoplasms	Control	250	11	4.40	4.03
	Wheat germ oil	270	10	3.70	
All	Control	766	49	6.40	6.19
	Wheat germ oil	753	45	5.98	

Incidence of Lymphomatosis: The distribution of lymphomatosis with reference to the lines selected for and against neoplasms, as well as the nonselected lines, is presented in table I. It is evident that the slight difference in the incidence of this neoplastic condition between genetically comparable groups fed wheat germ oil and the control ration were not significant.

On the other hand, differences between the lines were marked. The high neoplastic line had a percentage of incidence of lymphomatosis over five times that of the low line. The pullets from a cross of high-line male by low-line female had an incidence intermediate between the high and low lines. The reciprocal cross of low-line male by high-line female gave an incidence comparable to that of the low line; however, since the number of birds involved was comparatively small, no significance can be attributed to the reciprocal crosses. Furthermore, in unpublished data obtained prior to this experiment, approximately the same amount of lymphomatosis occurred in the reciprocal crosses.

The nonselected lines, while having had little attention paid to the character of mortality in the families, had been subject for a number of years to natural elimination of families with a high incidence of neoplasms. Perhaps as a result of this natural selection, the amount of lymphomatosis in these lines was but slightly higher than in the selected low line.

The data presented here give further evidence concerning the importance of breeding selection in the control of neoplastic diseases. Similar evidence obtained at other experiment stations has been reviewed by Taylor and Lerner[10] and by Marble.[11]

Types of Lymphomatosis and Age of Onset: Although the incidence of lymphomatosis as a whole was not affected by the rations, a nutritional effect might conceivably have influenced the relative proportion of certain types of lymphomatosis or the age of onset of the disease. That neither of these possibilities was realized in this experiment is illustrated by the data presented in table II, in which the percentage of incidence of each type of lymphomatosis is based upon the number of birds alive at the beginning of each age period. These data indicate that the differences between the wheat germ oil and the control groups for the incidence of each type of lymphomatosis were so small that they were not statistically significant. Despite the greater percentage of incidence of total cases of lymphomatosis in the first two age periods

for the control group and the greater incidence in the last two periods for the wheat germ oil group, the differences between the groups proved not to be significant. The test for homogeneity yielded a χ^2 of 1.321, corresponding to a P point between .70 and .80.

The incidence of each type of lymphomatosis in the group fed wheat germ oil and in the controls, during the entire course of this experiment, is also presented in table II under the age period 2.5-10 months. The percentage of incidence is here based on the number of birds alive at ten weeks of age. In each case the χ^2 test showed that the differences between the groups were not significant. In fact, the incidence of visceral lymphomatosis and of iritis were slightly, though not significantly, higher in the group fed wheat germ oil than in the control. From the data, it is evident that wheat germ oil was ineffective in preventing lymphomatosis or in altering the course of the disease.

TABLE II—Age distribution and total incidence of each type of lymphomatosis.

		Wheat Germ Oil Group					Control Group				
Age period	Months	2.5-4	5-6	7-8	9-10	2.5-10*	2.5-4	5-6	7-8	9-10	2.5-10*
Birds at beginning of period	Number	753	738	710	675	753	766	752	716	662	766
Birds with neurolymphomatosis	Number	4	5	11	3	23	8	6	10	3	27
	Percentage	0.53	0.68	1.55	0.44	3.05	1.04	0.80	1.40	0.45	3.52
Birds with visceral lymphomatosis	Number	2	6	8	9	25	2	11	7	5	25
	Percentage	0.27	0.81	1.13	1.33	3.32	0.26	1.46	0.98	0.76	3.26
Birds with iritis	Number	0	1	4	4	9	0	0	4	3	7
	Percentage	0	0.14	0.56	0.59	1.19	0.00	0.00	0.56	0.47	0.91
Total cases of lymphomatosis†	Number	5	9	18	13	45	8	15	16	10	49
	Percentage	0.66	1.22	2.54	1.93	5.98	1.04	1.99	2.23	1.51	6.40

*Percentages in this column are based on the number of birds at the age of 2.5 months and do not represent the sum of the percentages in the four preceding columns.

†Due to certain birds having more than one type of lymphomatosis, the numbers and percentages given under this heading are less than the sums of all types given above.

Conclusions

The data clearly show that, under the conditions of this experiment, the feeding of wheat germ oil had no appreciable effect on the incidence, type, or age of onset of lymphomatosis. In this experiment the genetic constitution of the stock was responsible for the differences observed in the incidence of lymphomatosis. This conclusion is in agreement with previous work on this flock, wherein the principal identifiable variable associated with the disease was of genetic nature.

References

[1]Butler, W. J., and Warren, D. M.: Fowl leukemia and vitamin E. Jour. A.V.M.A., xcii (1938), n. s. 45 (2), p. 204.

[2]Butler, W. J., Warren, D. M., and Hammersland, H. L.: Nutrition as a factor in the incidence of fowl leukosis. Jour. A.V.M.A., xciii (1938), n. s. 46 (5), p. 307.

[3]Adamstone, F. B.: A lymphoblastoma occurring in young chicks reared on a diet treated with ferric chloride to destroy vitamin E. Amer. Jour. Cancer, xxviii (1936), p. 540.

[4]Adamstone, F. B., and Card, L. E.: A study of the spermatozoa of the fowl with special reference to osmiophilic bodies in the sperm head. Jour. Morph., lvi (1934), p. 325.

[5]*Idem:* The effects of vitamin E deficiency in the testis of the male fowl (*Gallus domesticus*). Jour. Morph., lvi (1934), p. 359.

[6]Cole, R. K.: Vitamin E and avian neurolymphomatosis. Sci., n. s. lxxxviii (1938), p. 286.

[7]Barber, C. W.: A study of fowl paralysis. Corn. Vet., xxix (1939), p. 41.

[8]Jungherr, E.: Wheat germ oil in the control of fowl paralysis and kindred diseases. Proc. 42nd Ann. Meet. U. S. Live Stock Sanitary Assn. (Nov., 1938), p. 171.

[9]Norris, L. C.: Here are the facts on vitamin E. Everybody's Poul. Mag., xliv (1939), 2, p. 5.

[10]Taylor, L. W., and Lerner, I. M.: Breeding for egg production. Calif. Agr. Exp. Sta. Bul. 626 (1938).

[11]Marble, D. R.: Breeding poultry for viability. Pa. Agr. Exp. Sta. Bul. 377 (1939).

A Pathogenic Trichomonas from the Upper Digestive Tract of Chickens

By N. D. LEVINE* and C. A. BRANDLY,* D. V. M.

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IT HAS long been known that *Trichomonas columbae* is the cause of a disease of the upper digestive tract of pigeons. A description of the disease was given recently by Cauthen.[1] In 1930 Volkmar[2] described a similar disease in turkeys. He named the causative protozoön *Trichomonas diversa*. A later study on the transmission of the disease described by Volkmar was made by Hawn.[3] In 1933 an account of studies on apparently the same condition described herein was given by Gierke.[4] The present paper reports the occurrence of a spontaneous trichomoniasis of the upper digestive tract in a flock of chickens in Illinois.

Six live White Rock pullets, about 4 months old, from a flock of approximately 350 in which continuous and persistent losses had occurred were examined at the laboratory.† In one pullet dry, multiple caseous foci were found on the mucous membrane of the crop, anterior proventriculus, and esophagus (fig. 1). These foci were smaller than those usually found in trichomoniasis of turkeys or pigeons and resembled the lesions found in thrush (moniliasis). In three birds the crop wall was thickened and superficial erosion was observed over a large portion of its surface. In two birds the mucous membrane lining the crop and esophagus was apparently normal on gross examination. Microscopic examination of fresh smear preparations revealed abundant trichomonads both in the lesions and in the crops of all six birds. Neither fungi nor yeasts were seen. Cultures made from the crop lesions for pathogenic fungi and yeasts were negative. Bacteriological cultures of the livers also were made.

About a third of the pullets in the flock had died. At autopsy, a number of pathological factors and conditions were found which, in various combinations, were probably responsible for the losses. These included, besides trichomoniasis, moderate pediculosis, heavy roundworm and tapeworm infestations, coccidiosis, coryza, and leukemia. In addition, *Salmonella pullorum* was cultured from the liver of one bird. No trichomonads were found in the ceca of any of the birds examined either by direct microscopic observation or by culture.

Fig. 1. Caseous lesions due to Trichomonas in the crop and esophagus of a chicken.

The trichomonads were cultured in Ringer's egg-serum-glucose medium and, at the time of writing, have been passed

*Assigned by the state department of agriculture to assist in diagnostic work.

†For specimens submitted and assistance given in gathering the history of the losses, the writers are indebted to Dr. F. G. Loomis, Yorkville, Ill.

through 42 serial transfers in a period of about three months.

Attempts to transmit the infection to turkeys, pullets, baby chicks and pigeons were unsuccessful, except in the case of one pigeon. This pigeon, which died four weeks after exposure, was found to have a single, large caseous lesion in the crop, occluding the entrance to the lower esophagus. Trichomonads were present in the lesion and in the crop of the bird.

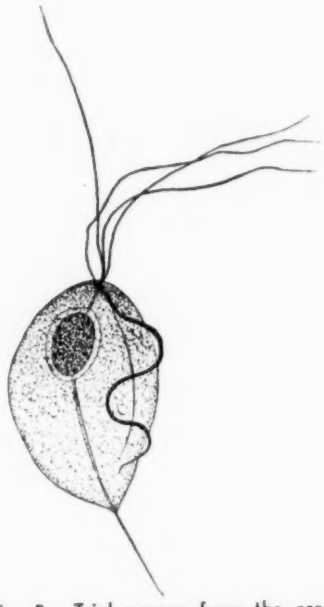

Fig. 2. Trichomonas from the crop of a chicken in culture. Camera lucida drawing (approx. x 4,000).

Trichomonads in culture were fixed in Champy's fluid and stained with Heidenhain's iron alum-hemtoxylin. Figure 2 shows a characteristic individual. The body is typically pear-shaped, with the nucleus at the anterior end. Flagellar counts on well stained protozoa were made both after this stain and after the nigrosin stain described by Cleveland.[5] Four anterior flagella arise from a blepharoplast anterior to the nucleus. The posterior flagellum is rather thick and lies along the undulating membrane, which extends about two-thirds the length of the body. It does not extend posteriorly from this point as a trailing flagellum. The costa, running along the base of the undulating membrane, was seen in most individuals. The axostyle is slender and extends a considerable distance beyond the body. A cytostome was seen in a few individuals. The parabasal body could be seen only very indistinctly in the individuals examined.

Morphologically, except for a relatively longer axostyle, this Trichomonas is very similar to the published figures of *T. columbae* and *diversa*. Stabler[6] believes that these two species are the same, although his experimental data do not establish their synonymity conclusively. The preliminary transmission experiments described herein are obviously insufficient to clarify the situation completely, although they do show that pigeons can be infected with the protozoön. No obvious source of infection could be found in the immediate environs of the outbreak. Turkeys were not raised within a five-mile radius. While pigeons did not inhabit the premises, some of these birds which nested in the buildings on a neighboring farm occasionally flew to the chicken yard.

SUMMARY

A disease of the upper digestive tract of chickens associated with Trichomonas is described. The gross pathological lesions observed in naturally affected chickens resemble the trichomonad lesions encountered in pigeons and turkeys. The morphology of, and preliminary animal exposure experiments conducted with, the causative Trichomonas indicate that it may be a strain of *Trichomonas columbae*.

References

[1]Cauthen, G.: Studies on *Trichomonas columbae*, a flagellate parasitic in pigeons and doves. Amer. Jour. Hyg., xxiii (1936), pp. 132-142.

[2]Volkmar, F.: *Trichomonas diversa* n. sp. and its association with a disease of turkeys. Jour. Parasitol., xvii (1930), pp. 85-89.

[3]Hawn, M. C.: Trichomoniasis of turkeys. Jour. Inf. Dis., lxi (1937), p. 184.

[4]Gierke, A. G.: Trichomoniasis of the upper digestive tract of chickens. Monthly Bul., Dept. Agr., State of California, xxii (1933), 4-5, p. 205.

[5]Cleveland, L. R.: *Tritrichomonas fecalis* nov. sp. of man; its ability to grow and multiply indefinitely in faeces diluted with tap water and in frogs and tadpoles. Amer. Jour. Hyg., viii (1928), pp. 232-255.

[6]Stabler, R. M.: The similarity between the flagellate of turkey trichomoniasis and *T. columbae* in the pigeon. Jour. A. V. M. A., xciii (1938), n. s. 46 (1), pp. 33-34.

EDITORIAL

Adios, "New Series"

BEGINNING with this issue, the term "New Series, Vol. — No. —" is discontinued. Only the old number of the volume will be used for identification. And, conforming to modern usage, the number of the given issue will indicate the actual number of issues printed and circulated since Volume I, Number 1, came to life in January of 1877.

Thus, this issue (July, 1939) becomes Vol. XCV, No. 748. The volume number (95) does not correspond to the publication's 62 years of existence because two volumes of six months each superseded the original 12-month volumes. This explanation seems necessary to prevent uninformed readers from translating the figure 95 (XCV) into years. Your journal is 62, not 95, years old.

The JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION was founded by the national association in 1877 under the name, "American Veterinary Review," and although for 35 of the 62 years it went into private hands after four years of ownership, it never ceased, in effect, to be the official organ of the Association. In 1915, or 24 years ago, it was again taken over "bag and baggage" and again brought under the complete ownership and management of the Association.

In books and current literature, the dual identification of our monthly confuses the authors to such an extent that some use both figures, some the old, and others only those of the new series. An example of this confusion may be found in the new book, "The Clinical Use of Sulfanilamide and Sulfapyridine," by Long and Bliss. Among the list of references we find:

Allott, A. J.: J. Am. Vet. Med. Assoc., *44:* (N.S.) 588, 1938.

Bryant, J. B.: J. Am. Vet. Med. Assoc., *93:* 117, 1938.

Both appear on the same page in such a way as to leave the seeker of references wondering just where the article he wants to consult will be found. The above references are, of course, in the same volume, the one on page 588 and the other on page 117. But how many readers would know that? Inasmuch as authors try to simplify our strange system of numbering, they ignore one or the other of the series that should appear, that is, either the old or the new. We bid *adios* to the New Series idea to abolish such confusion.

Moreover, the age of a periodical is its most precious asset, an asset to venerate, not to demote so rudely by pretensions of youth so many years after the growing pains of adolescence have yielded to the vigor of healthy maturity.

Bachelors of Art

ACCORDING to a ruling of the United States Civil Service Commission, approved by the Bureau of Animal Industry, United States Department of Agriculture, the D.V.M. degree now conferred by the veterinary colleges on their graduates is, in effect, the equivalent of the degree of Bachelor of Arts, and will be so rated in applications for civil service examinations. Otherwise stated, the B.A. degree is the minimum requirement in preliminary education for positions in the veterinary service. As the regular age limit for applicants is 34, all veterinarians who have been graduated since the four-year course went into force are eligible candidates. The ruling, however, excludes from the examinations those who have been made eligible by extension of the age limit to war veterans *et al* but who do not possess the necessary B.A. rating.

Plans Completed for A. V. M. A. Day at World's Poultry Congress

PLANS for a successful A.V.M.A. Day at the forthcoming Seventh World's Poultry Congress to be held in Cleveland, Ohio, July 28 to August 7, are sufficiently complete to assure those attending an occasion not soon to be forgotten.

THE HALL OF LIVE POULTRY, WORLD'S POULTRY CONGRESS

The most comprehensive collection of all breeds and varieties of poultry ever assembled for any exhibition will be on display in this hall.

August 2 is the date, and the program is complete—the subject matter chosen carefully to contribute all possible benefit from such a gathering to aid the general practitioner, the speakers well qualified to do the job briefly and yet completely.

Attendance at the afternoon program is limited to veterinarians and junior and senior veterinary students, in order that the symposium following the program may become a frank discussion of poultry problems in veterinary medicine.

Following is the program of the complete day's activities:

Morning

Pathology and Disease Control—Section 3. Little Theatre (on Congress grounds).

Noon

Luncheon and afternoon program at Hotel Carter ballroom, with a special program of entertainment, service starting promptly at 12:15 p. m.

Afternoon

Remarks by Cliff D. Carpenter of Fort Wayne, Ind., Chairman, A.V.M.A. Day.

Welcome to the Congress, by Professor J. E. Rice, General Chairman, Seventh World's Poultry Congress, Mexico, N. Y.

Response, by H. D. Bergman, Iowa State College, Ames, Iowa.

Presentation of Foreign Veterinary Delegates, by John R. Mohler, Washington, D. C.

"Veterinary Contributions to the World's Poultry Congress," W. R. Hinshaw, Davis, Calif.

"Preparing the Veterinary Student for Poultry Practice," O. V. Brumley, Columbus, Ohio.

"The Value of Avian Pathology Research to the Practitioner," C. A. Brandly, East Lansing, Mich.

"The Specialist in Poultry Practice," Walter E. Brandner, Petaluma, Calif.

"Poultry Problems of the General Practitioner," Frank C. Tucker, Claypool, Ind.

"The Importance of Sound Breeding, Feeding and Management Programs in Maintaining Resistance Against Poultry Diseases," Charles B. Cain, Memphis, Tenn.

Symposium: How the General Practitioner May Benefit from Improved Relationship with the Leaders of the Poultry Industry.

Evening

All States' Banquet.

The ladies, too, are invited. There will be many entertainment features, teas and

other functions of special interest to them. They are invited especially to the A.V.M.A. luncheon, where they will meet famous veterinarians from all over the world who will be special guests.

Plans have been made to entertain 500 veterinarians and, with the host of poultry folks attending other Congress features, three necessary details should be attended to as soon as your plans are made to be there. The first is to write Mr. Ed. Brennan, 1604 Terminal Tower, Cleveland, specify your A.V.M.A. affiliation and secure from him hotel accommodations. Specify Hotel Carter, but don't be disappointed if he can not give you just what you want. The Cleveland committee informs us that reservations have come in great numbers. Hotels Statler and Hollenden, Auditorium Hotel and others are only a few blocks away. If you prefer being housed with private families, so specify in your letter to him.

The second important detail is to write Dr. Morley A. Jull, University of Maryland, College Park, Md., and secure your full Congress membership, which will admit you and one member of your family to all Congress sections and official functions, including the afternoon reception and tea for the ladies. Such membership also includes an official copy of all papers presented during the eleven days of the Congress—an invaluable library of information covering what is known today in the poultry world of genetics, nutrition, incubation, pathology and disease control. Such a volume will prove a wonderful reference for many years to come. Details for securing these memberships will be found on page 638 of the June issue of the JOURNAL.

The third important detail is to fill out the blank on page xix of this issue and mail to the Arrangements Chairman, Cliff D. Carpenter, before July 25, if possible, indicating your table reservations for the A.V.M.A. luncheon.

Early indications are that a large number will attend this featured day. Two or three days spent at this Congress will give the practitioner a complete picture of the poultry industry, will assist him manifold to meet better the problems of the poultryman in his regular practice. Plenty of opportunity will be had to exchange ideas with professional men from all over the world.

Another quarter of a century at least will have passed before this Congress again visits America. As veterinarians, let's grasp

eagerly this opportunity to broaden our vision, raise our sights, and be better prepared to go forth in our daily practice to assist the second greatest agricultural crop in this country—the poultry industry.

Seventy-Six Years of Progress

WHEN the "40 of '63" met in New York City to organize what is now the A.V.M.A., the stage coach, prairie schooner, and pony express were yet to yield to the "iron horse," as the first locomotive was dubbed. The network of railways, highways and airways now threading the country with countless miles of arterial lanes could not have been dreamed of even by the mahatma of that hour, nor could those 40 have dreamed that the society they were forming would grow to one of over 5,000 members, all carefully chosen on the basis of their ethics and education.

A good way to see what the thoughtfulness of these men accomplished is to visit the veterinary exhibit sponsored by the A.V.M.A. at the World's Fair in New York, the birthplace of the Association.

A catalogue of the exhibits in the Hall of Medicine that has been widely circulated contains the following section:

EXHIBIT OF VETERINARY SAFEGUARDS AND PUBLIC HEALTH SPONSORED BY THE AMERICAN VETERINARY MEDICAL ASSOCIATION.

Veterinary Medicine and Public Health Committee:

John R. Mohler, D.V.M., *Chairman*
W. A. Hagan, V.M.D.
D. H. Udall, D.V.M.
Adolph Eichhorn, D.V.S.
C. E. DeCamp, D.V.M.
R. F. Eagle, D.V.S.
John G. Hardenbergh, V.M.D.
Cassius Way, D.V.M.
R. S. MacKellar, Jr., D.V.M.
C. P. Zepp, D.V.M.

Axby Appoints Secretary-Treasurer of U. S. L. S. S. A.

PRESIDENT Axby of the United States Live Stock Sanitary Association has appointed L. A. Merillat, executive secretary of the A.V.M.A., to fill out the unexpired term of Secretary-Treasurer L. Enos Day, who died in May. The property of the Association has been moved to 221 N. LaSalle St., Chicago, Ill., where correspondents will please address their mail.

Memphis Exhibits

THE LEADING editorial in the *Journal of the American Medical Association* for May 27, 1939, starts out thus: "Foremost again among the features of the meeting was the scientific exhibit, pronounced by most of the physicians in attendance as the greatest opportunity for concentrated graduate education available anywhere in the world."

This pronouncement is a hint for our association to develop this feature of the annual convention. But, to accomplish this it must have the coöperation of the exhibitors, who in turn must be treated in such a way as to encourage them to make their exhibits one of the feature events of each convention.

Elsewhere in this issue is a brief account of what those who attend the Memphis convention may expect in the matter of displays of the products of scientific apparatus used in clinical work. To this will be added a report of what was displayed in one of the post-convention numbers. Exhibitors are invited to coöperate with the reporter in charge of writing up this feature. Literature describing products and apparatus displayed is desirable.

Problems in Milk Sanitation

IN AN article entitled, "Engineering Problems in Milk Sanitation," by Leslie C. Franks, senior sanitary engineer, United States Public Health Service, the author emphasizes the complexity of the subject. Milk sanitation no longer can be considered a problem for veterinarians, bacteriologists, and epidemiologists. It includes also the engineers of all the sanitation of milk that is related to the health of animals. Some would claim that it is a problem for veterinarians. On the same premises, the art may be claimed for the bacteriologist, the chemist, and the physician.

Only recently has the engineer stepped in to qualify in this important domain. Although we have had sanitary engineers for a long while, the author points out that until very recent times, graduate sanitary engineers received no training whatsoever on milk sanitation in their undergraduate work. This being true, the engineers were the least qualified to adapt their talents to the business of supplying safe milk to the people. The quite general belief, however, that pasteurization has become the only practical means of furnishing safe milk to the public, has made this heating process submerge all other measures. In other words "cook the stuff" and let the engineer see that the cooking is properly done.

We believe that sanitary engineers are important figures of the present social scheme. Pasteurization has become so popular—that is to say, so necessary—that in communities of over 10,000 population, 83 per cent of the milk consumed undergoes that treatment. In smaller communities the percentage is lower.

APPLICATIONS

No finer tribute to organized veterinary medicine can be found than that revealed in the following record-breaking enrollment of men who seek to participate in its activities. There are many things that must be done, however, before the profession reaches the peak of achievement it is striving to attain. It needs the cooperation of every eligible veterinarian. The applicants for membership this month, two hundred and five strong, seem to indicate that this cooperation is on the way.

First Listing*

ABELL, LEONARD JASON
Rome, Pa.
V. M. D., University of Pennsylvania, 1939. Vouchers: William J. Lentz and Jack D. Beck.

ADAMS, DALE SANFORD
Webb, Iowa.
D. V. M., Iowa State College, 1939. Vouchers: H. D. Bergman and Chas. Murray.

ALLEN, FRED W.
Elberton, Ga.
D. V. M., Indiana Veterinary College, 1913. Vouchers: R. L. Mundhenk and J. E. Severin.

ALVANOS, COSTAS
111 Division St., East Lansing, Mich.
D. V. M., Michigan State College, 1939. Vouchers: C. F. Clark and E. T. Hallman.

ANDREWS, F. WHIPPLE
309 Mason, Fort Collins, Colo.
D. V. M., Colorado State College, 1939. Vouchers: James Farquharson and Harry W. Johnson.

ARTEAGA, MANUEL RAMON
346 W. Grand River, East Lansing, Mich.
D. V. M., Michigan State College, 1939. Vouchers: C. F. Clark and B. J. Killham.

ATKINSON, JAMES THOMAS
619 Dallas Ave., Selma, Ala.
D. V. M., Alabama Polytechnic Institute, 1938. Vouchers: R. L. Mundhenk and W. E. Cotton.

AYRES, JOHN PATRICK
Corbettsville, N. Y.
D. V. M., Cornell University, 1939. Vouchers: Walter J. Gibbons and Gordon Danks.

BAILEY, LUCIAN PERCY
Rock, W. Va.
D. V. M., Iowa State College, 1939. Vouchers: H. D. Bergman and Chas. Murray.

*See January, 1939, JOURNAL.

BARRETT, C. D.
2221 Cedar Springs Road, Dallas, Texas.
D. V. M., Texas A. & M. College, 1939. Vouchers: R. P. Marsteller and L. A. Merillat.

BARROWS, ERNEST D.
801 Elizabeth St., Fort Collins, Colo.
D. V. M., Colorado State College, 1939. Vouchers: James Farquharson and Harry W. Johnson.

BASSETT, DELL CLARE
1929 N. E. 64th Ave., Portland, Ore.
D. V. M., Cornell University, 1925. Vouchers: Sherman L. Brown and Chas. H. Seagraves.

BECKLEY, ELIZABETH G.
679 Crescent Ave., Buffalo, N. Y.
D. V. M., Cornell University, 1939. Vouchers: E. Sunderville and H. H. Dukes.

BEEBE, RALPH
123 State St., Traverse City, Mich.
D. V. M., Michigan State College, 1939. Vouchers: C. F. Clark and B. J. Killham.

BELL, WILSON BRYAN
200 Willard Way, Ithaca, N. Y.
D. V. M., Cornell University, 1939. Vouchers: Alexander Zeissig and Clifford W. Barber.

BENT, CLARENCE FARRAR
Derry Road, Hudson, N. H.
D. V. M., Cornell University, 1939. Vouchers: J. N. Frost and H. C. Stephenson.

BIRCH, FRANK
Route 2, Ithaca, N. Y.
D. V. M., Cornell University, 1939. Vouchers: A. G. Danks and D. H. Udall.

BJORNSON, SIDNEY S.
1142—12th St. N., Fargo, N. Dak.
D. V. M., Iowa State College, 1939. Vouchers: H. D. Bergman and Chas. Murray.

BLY, HOWARD J.
1817 Church St., Evanston, Ill.
D. V. M., Colorado State College, 1939. Vouchers: James Farquharson and Harry W. Johnson.

BONDS, THOMAS EDISON
Box 191, Russellville, Ala.
D. V. M., Alabama Polytechnic Institute, 1938. Vouchers: R. L. Mundhenk and G. D. Ingram.

BOONE, WILLIAM LESTER
Baxley, Ga.
D. V. M., University of Georgia, 1924. Vouchers: Chas. C. Rife and J. E. Severin.

BOWSTEAD, WARREN ELBERT
Lowden, Iowa.
D. V. M., Iowa State College, 1939. Vouchers: H. D. Bergman and Chas. Murray.

BOYER, MARCUS EARL
Lena, Ill.
D. V. M., Iowa State College, 1939. Vouchers: H. D. Bergman and Chas. Murray.

BRIDGMAN, RICHARD J.
Slaterville Road, Ithaca, N. Y.
D. V. M., Cornell University, 1939. Vouchers: J. N. Frost and H. J. Milks.

BROCK, CADWALLADER
Grove Hill, Ala.
D. V. M., Alabama Polytechnic Institute, 1939. Vouchers: R. L. Mundhenk and W. E. Cotton.

BURNS, CHARLES CATES
301 E. Magnolia, Auburn, Ala.
D. V. M., Alabama Polytechnic Institute, 1939. Vouchers: R. L. Mundhenk and J. E. Greene.

CAMERON, WALTER E.
137 W. Lake, Fort Collins, Colo.
D. V. M., Colorado State College, 1939. Vouchers: R. F. Bourne and James Farquharson.

CARLE, BIRDSALL N.
1135—3rd St., Poterville, Calif.
B. S., D. V. M., Washington State College, 1939. Vouchers: E. E. Wegner and J. E. McCoy.

CARTER, ROSS MARSHALL
Alexis, Ill.
D. V. M., Chicago Veterinary College, 1920. Vouchers: John D. Reardon and L. A. Merillat.

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Nutrition

IN THE 27 years since the word "vitamin" was coined and found its way to every tongue in every household, the practice of medicine has had to change its strategy in the war on disease. Although grudgingly admitted, physiology is openly superseding pathology in the conquest against the enemies of higher life. The imperfect biological process, which is, or which leads to, disease, has become the cynosure of all eyes in the battlefield of medicine, in fact, so markedly that the hope of the future in medicine seems to lie in the science of nutrition. In other words, what is eaten is becoming more important than the ambient vicissitudes catalogued *seriatum* in the science of etiology. The one is the cause; the other (with reservations) is the effect.

That contracting disease or surviving from it is pretty much a case of survival of the fittest—the well nourished—is no longer hypothetical. The savage raids of physical and biological causes are now understandable, although one must confess that the most alert find it difficult to keep in touch with all of the progress that is being made on the nutritional front. The alphabet is getting too short to name even the vitamins and all of their divisible components, not to mention the minerals and proteins in kind and quantity required to maintain the functional and structural equilibrium constituting health in its highest estate.

Nutrition, in the light of what has developed since Eijkman's historic discovery, is destined to mount to a higher and higher place in medical science because it augments the main objective—prevention. In veterinary medicine, because dependable reproduction, gains and growth, and losses from disease govern success and failure of a basic industry, the study of nutrition is apt to be rated as a special branch of the practitioner's curriculum.

CLINICAL DATA

Short Wave Therapy in Veterinary Medicine*

By DR. A. KARSTEN

Berlin

SHORT WAVE therapy, today, has a vast field of application. It is called short wave therapy because the apparatus employed are similar, in the principle of construction, to those used in wireless telegraphy. The waves sent out by these apparatus are generally 3 to 15 m. long, according to the end to be attained. A wavelength of 6 m. has proved to be particularly advantageous

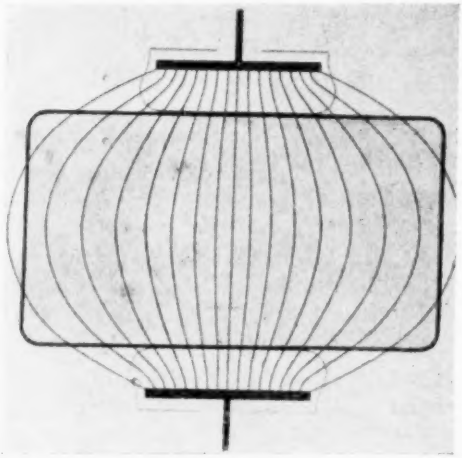

Fig. 1. Schematic drawing of the lines of force of the condensing field between two electrodes of equal dimensions.

in most all of the cases treated. One often distinguishes short waves and ultrashort waves of 3 to 10 m., although short waves extend as long as 10 to 100 m. Literally, the denomination of therapy in wave lengths is not correct. Properly speaking, they are not waves; they are currents of high frequency, produced in the transmitter, which penetrate the patient.

The patient is placed between two metallic plates forming the electrodes in such a way as to be under the action of the electric field emanating from the electrodes, which are placed 2 to 10 cm. from the patient's body. The electric field produces a current which, in the patient's body, transforms to Joule effects the therapeutic action of short waves. At least, the main part of the therapeutic action is attributed thereto.

There remains to be shown the phenomena to which the good results of short waves are due. This question is still in dispute. In any event, it seems rational to suppose that the benefits of short wave therapy are due to a specific electric action as distinguished from diathermy and other treatments by heat. In the production of heat in the tissues there is observed a persisting hyperemia of the capillaries and arteries which continues for a day or more. One also observes a stimulation of phagocytosis and a bactericidal action. In this way, short waves are an aid of the first order in acute purulent and septic diseases. In view of the long duration of the hyperemia of the capillaries and arteries, one can not suppose that the action is due to the heat generated by them. Pflomm explains the phenomenon as an augmentation of parasympathetic tonicity and diminished sympathetic tonicity of the vessels bathed by the waves. The activation of the calcium ions has also been observed to the extent of restoring deteriorated vessel walls.

Above all, short wave therapy produces a deep thermic action. This is due to the fact that the physical conditions are more favorable in short wave therapy than in diathermy in bringing energy and heat to the body. As a consequence, the deep thermic action is largely ameliorated com-

*Translated from Receuil de Médecine Vétérinaire, cxv (March, 1939), pp. 159-166.

pared with diathermy and, on the other hand, it affects parts that are poor conductors (bone, fat, air). The shorter the wave, the more intense is the action on the deeper parts. That is why a wave length of 6 m. is preferred in the treatment of organs covered with fat or bones.

Excellent results are obtained in human medicine in the treatment of various purulent diseases of the thorax (pulmonary abscess, purulent pleuritis); of certain cases of pulmonary and laryngeal tuberculosis; of certain forms of tuberculosis of the skin; of certain diseases of the female genital organs; of various tumors and divers superficial abscesses; and of eczema, erysipelas, and zona. A particularly interesting domain for the use of short waves are the purulent affections of the internal organs, rheumatism, neuralgia, arthritis, and traumatic bone diseases (Schliephake, 1937). Short wave therapy has also given better results than diathermy in affections of the gall bladder and cirrhosis of the liver. The method must be employed in a convenient manner.

No injury is produced, as Baar observed, in long treatments of the genital organs, although these are extraordinarily sensitive to x-rays. Schliephake introduced short wave therapy in 1929 after having used it successfully on a furuncle of the nose. Today, its use is universally known.

In recent years, this therapy has been introduced more and more in veterinary medicine, particularly in dogs and horses. The hair is an obstacle to the passage of both heat and electric currents to the extent that diathermy is not applicable in hairy animals. The treatment in the condensing field opens new possibilities, as it permits the heating of the interior of the body without heating the skin.

The part of the body to be treated is placed between the electrodes before the apparatus is put into operation. According to the object to be attained, electrodes of equal or of different dimensions are used. The duration of the irradiation and the power of the apparatus can be conveniently regulated, and the action can be governed by placing the electrodes at different distances from the skin.

The distances are of premier importance in short wave therapy. These are illustrated in the schemic drawings of the power of the condensing field. Figure 1 puts in evidence the importance of the structure of the field of lines of the power exerted on the thermic action at the depth.

In working with different distances between the electrodes and the skin, it will

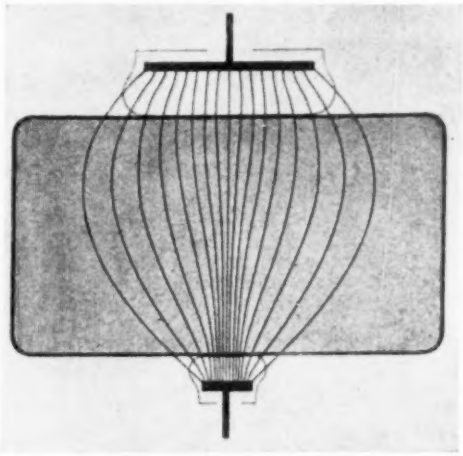

Fig. 2. Schematic drawing of the lines of force between electrodes of different dimensions (asymmetrical effect). Reproduced from Recueil de Médecine Vétérinaire, March, 1939.

be seen that at the side of the electrode nearest the skin, the entrance place of the lines being more reduced, the heat is stronger than upon the other side. When the distance of the electrode from the skin is too close, small protuberances appear on the skin and the patient experiences a pricking sensation. If electrodes of different dimensions are employed, one observes an asymmetric distribution of the heat (fig. 2). The region close to the electrode heats up more. Figure 3 shows the supple condensing electrodes comporting a leaf of metal covered with vulcanized rubber. They are furnished in different dimensions. The long electrodes are handy for the treatment of the extremities covered with bandages.

As a rule, placing the electrodes is simple. Some difficulties arise in the treatment of paralyses, the articulations of the foot, and the coronet and hoof, but such difficulties can be surmounted by using prudence. For example, if the electrode is

placed directly upon the hoof, the horn may burn. In that case, one uses a wooden stool slightly oblique, 50 cm. long and 30 cm. wide, and 50 cm. high in front and

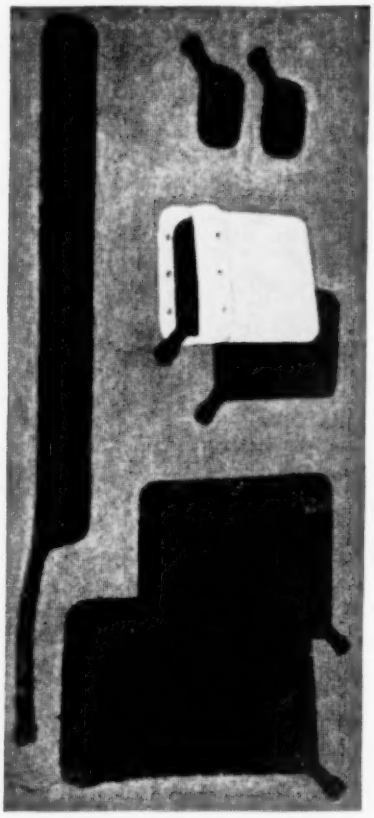

Fig. 3. Pliable condensing electrode composed of a pliable metal plate covered with vulcanized rubber. Reproduced from Recueil de Médecine Vétérinaire, March, 1939.

18 cm. behind, upon which is placed a large electrode covered with several layers of felt protected with cellulose. In certain technics, the condensing electrodes of Schliephake (fig. 4) with movable plates are advantageous. It is sometimes utilitarian to use a Schliephake electrode and a pliable one.

Short wave therapy has given particularly good results in the treatment of horses. A case of pneumonia caused by exposure to cold was treated by placing a large, active electrode on the affected side and a neutral electrode on the other side of the thorax. Improvement was obtained on the second day of the treatment and, on the fifth day, the vesicular murmur, the pulse, and the respirations were normal. A purulent catarrh of the sinuses which had resisted all treatments was bathed with the condensing field by placing the small, active electrode at the throat, and neutral electrodes of larger dimensions over the surface of the sinuses. Several treatments were sufficient to clarify and liquefy the discharge.

For the treatment of abscesses, suppurating wounds, contusions due to blows, punctures, or falls, short wave therapy is equally indicated. The purulent foci cure up in a short time. The cure is probably due to the bactericidal effect upon staphylococci and tubercle bacilli, as was demonstrated by Schliephake under certain conditions. Pain due to saddle, harness, or bridle sores, and strains of joints, ligaments, and tendons yield to the treatment. The treatment also has been employed in colics.

In employing short wave therapy certain rules should be followed. The procedure is more complicated than diathermy. The choice of apparatus is important; it should suit all of the exigencies of practice, especially in respect to being regulated to slight and strong power.

Two genres of apparatus may be chosen: the eclateur type and the lamp type. The modified oscillations of the former and the sustained oscillation of the latter qualify

Fig. 4. Electrode of Schliephake with rigid movable plate adjustable to any distance from the skin electrode. Reproduced from Recueil de Médecine Vétérinaire, March, 1939.

them for use in dogs and large animals, respectively. The lamp type produces currents two to three times stronger than the other. It is, therefore, the one commonly used in veterinary practice. Preference is given to waves of 6 m. The waves have an intense effect upon the deeper zone of the treated structure, and this fact is what makes short wave therapy efficacious in the treatment of the large, bulky structures of horses (fig. 5).

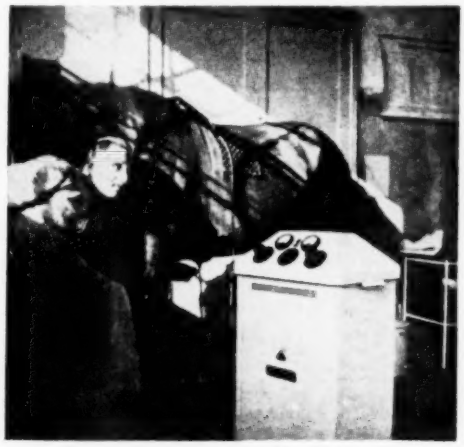

Fig. 5. The lamp-type of apparatus for short wave therapy. Treatment of a horse. Reproduced from Recueil de Médecine Vétérinaire, March, 1939.

Short wave therapy has been well introduced in veterinary medicine. The experimental work and the clinical reports already published in special literature lead to the conclusion that this new therapy, which is so efficacious in human medicine, will also become important in the treatment of animals.

Bibliography

Hintersatz: Beitrang zur behandlung in kurtzwellen—kondensatorfeld in der veterinarmedizin Zeit. f. Veterinark., 1, xlviii. Study relative to the application of the condensing field of short waves in veterinary medicine).

Schliephake: Kurzwellentherapie, June, 1931. Die ultra-kurzwellentherapie, Medizinische Welt 7, 1933.

The three principal textiles (cotton, silk and wool) can be made artificially in unlimited quantities; cotton and silk from rayon and wool from casein. The latter is chemically similar to natural wool.

Foreign Body in an English Setter

By SHEFFORD S. MILLER, D. V. M.
Larchmont, N. Y.

ALMOST every small animal practitioner has had experience with dogs that have chewed the cover off a golf ball and devoured the matrix of rubber bands. These cases are usually brought to the veterinarian after the animal has started to show symptoms of gastritis and even enteritis, and often end fatally.

The diagnosis is made either by a definite history, recovery of some of the offending material after the use of an emetic, or high colonic irrigation or x-ray. If it has been proved that the ball was not swallowed *en toto*, by either palpation or roentgenography, it is fair to presume that the bands are strewn throughout the length of the stomach and bowel, as postmortem examination on such cases has so often revealed. Operation in such a circumstance is obviously contraindicated.

Recently, we had an opportunity to use a psyllium (plantago ovata) preparation that was bland, having the irritant removed (Metamucil-Searle). This product forms a voluminous mucilaginous mass in the stomach and bowl when given with sufficient water, and passes through these organs undigested.

The dog in question is an English Setter about 9 years of age. Presented to us for examination on April 7, he had been ill for about two days previously, with vomiting and an insatiable thirst, only to bring the water up again within a few minutes.

Examination revealed an elevated temperature, rapid pulse, and abdominal pain. A colonic irrigation produced some gutta percha golf-ball covering in pieces and a few strands of rubber band. The dog was hospitalized and enemata were continued through the day. Water was withheld until April 8, when the psyllium preparation was added in liberal quantities (about three heaping teaspoonfuls during the day). He was able to retain this. Colonic washes were repeatedly administered and, finally, on April 10, large quantities of rubber

band started coming through, well encapsulated by the bulky, tenacious jell of the metamucil. On the following day the dog had a natural, jelled stool containing more of the foreign material, and from that day started to eat and made a good recovery.

Remarks: We believe that in the vegetable-muciloids we have a definite aid along with the usual methods in the treatment of intestinal foreign bodies that are small enough to pass the ilio-cecal valve but are too pliable to offer the bowel any friction for elimination. We consider the non-irritant, non-cathartic preparations better suited for this purpose, for it would be unwise to increase the peristalsis in such cases. The method of administration, of course, must depend on the individual case and judgment of the clinician.

Piroplasmosis in a French Poodle

By J. J. MERENDA, D. V. M.
New York, N. Y.

THE PATIENT was a male French Poodle, about 1 year old, which was raised in New York State. He was taken to Texas for three weeks and brought back on March 11,

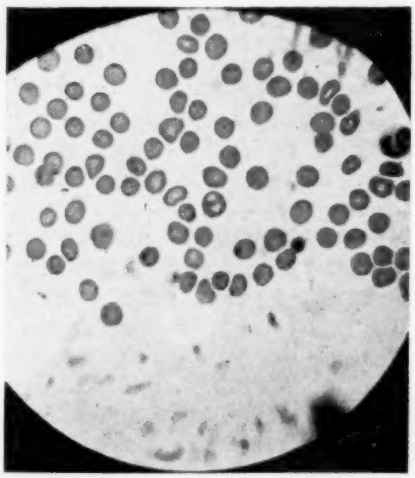

Fig. 1. Photomicrograph of the parasites found in the red blood cells of the patient.

1939. During the week that followed, the animal was listless and did not eat well, but the bowels were normal and he had not vomited.

The dog was presented for examination on March 18. The temperature was 103° F. The eyes, nose, and throat were normal. The patient was not sensitive over the abdomen and spleen, and the latter was normal. A blood examination for microfilaria proved negative. There were some tapeworm segments and a slight hookworm infestation in the feces. A few ticks were found on the body.

We hesitated to worm the patient because of the fever, and kept him under observation for two days. He ran a constant temperature of 103°. The stool was rather soft but he ate well. A pepsin and bismuth mixture was given and the bowels checked up in two days. The dog was returned to the owner on March 20.

On March 25, the animal was brought back to the hospital to be rechecked. The temperature was 103°. The owner had been recording the animal's temperature at home and said that it had varied between 103-103.5°. The dog appeared normal and there was no enlargement or sensitiveness of the spleen.

The owner had had another dog that apparently had died of piroplasmosis, but the parasites had not been found in the blood. In order to determine whether piroplasmosis was accountable for the condition of the patient (and this seemed quite probable), an experimental dog was prepared, on March 20, by removing the spleen. The recovery was uneventful and the stitches were removed on March 25. On this date, 25 cc. of the patient's blood was injected into the peritoneal cavity of the experimental animal. For six days following, the temperature was 101, 104, 104.5, 104, 104.5, and 103°, respectively. Throughout this period the bowels were normal and the dog ate well.

On March 28, two Wright's stains were made of the experimental dog's blood. In a few of the red blood cells were found pear-shaped bodies, either singly or in pairs. To confirm the diagnosis, slides were sent to Dr. D. A. Sanders of Gainesville, Fla., whom the writer wishes to thank

for his courtesy and assistance in diagnosing the case.

The technic for staining the blood is not difficult but care should be taken to make the blood smears as thin as possible, and they should be allowed to dry thoroughly. They are then stained with Wright's stain in the usual manner and examined under oil immersion. The parasites stain a very pale blue or white and are usually found in the red blood cells, either singly or in pairs (fig. 1). One should be careful to avoid confusing the piroplasms with artefacts, which are found in the red blood cells and result from improper staining or failure to dry the smear properly before staining. Artefacts appear as red circular or irregular bodies and, when the operator is focusing, they may appear colorless. They also may take a bluish stain but are much darker than the piroplasms.

The experimental dog has been kept without treatment in order that the course of the disease might be observed. The temperature has varied between 102.5-105°, usually ranging from 103-104°. The appetite has remained fairly good and the bowels have been normal. At the time of writing, the mucous membranes are somewhat pale but the dog acts lively and apparently has developed into a carrier, since the parasites are present in the blood.

Treatment of the Poodle: We decided to use neoarsphenamine because of the ease with which sterile solutions may be obtained and because it does not stain the body. On March 31, April 3, 5, 7, 10, 12, 14, and 20, neoarsphenamine was administered as follows: 0.15, 0.30, 0.6, 0.6, 0.75, 0.75, 0.75, and 0.6 gm., respectively. The temperature of the patient on these days was 103, 103.5, 102.5, 102, 102.5, 101.5, 101.5, and 101.5°, respectively. On April 17, the dog was wormed.

When the patient was discharged on April 24, he was eating well, the bowels were normal, and he was very bright.

Remarks: From April 10 until the time of discharge, the temperature did not exceed 102°. When 0.75 gm. of neoarsphenamine was given, the dog vomited shortly after injection but no other effect was observed. At no time during the treatment did the animal show any enlargement or sensitiveness of the spleen.

Subcutaneous Emphysema in a Foxhound

By GEORGE H. LUDINS, D. V. M.
Hartford, Conn.

ON February 14, 1939, four Foxhounds were running a fox. They were seen at 11:15 a. m., at which time all appeared normal. A few minutes later they holed a fox and did considerable barking and rooting at the hole. As the owner approached them, he saw an animal, coming toward him at a slow walk, which he did not at first recognize as one of his dogs. On close inspection he observed that the animal was "blown up like a balloon" (fig. 1).

Fig. 1. The dog was "blown up like a balloon."

The dog was brought to the hospital at about 6:00 p.m. Examination disclosed

the following: Temperature was normal; pulse slightly accelerated but of good tone; and respiration was labored but auscultation disclosed no abnormal sounds. Palpation revealed the presence of a great quantity of gas over the entire body, with the effect that the skin was ballooned out and

Fig. 2. Patient after treatment. Note that the swelling has disappeared completely.

stretched tautly from the tip of the nose to within four inches of the end of the tail. The ear flaps were about one inch thick at the base and rounded on the ends. The gas had invaded the subcutem to the toenails. The dog was fairly cheerful and comfortable, except that the skin was stretched so tightly that it was difficult for him to move. The appetite was good.

It was thought that a punctured lung or ruptured trachea had pumped the air under the skin, but careful digital examination and radiography failed to disclose any such lesion. We were then, and still are, at a loss to explain the cause of the condition.

Treatment: Since we thought that there was some connection with the lung, we hesitated to make any large incisions into the skin, for it was feared that a collapse of the lungs might result. However, the dog needed relief and, therefore, a 15-gauge needle was inserted into the skin over the hip and a large quantity of air was milked out. As far as could be determined by the odor, this gas was actually air. It was not inflammable.

At intervals of two days, air was withdrawn through needles from all parts of the body. For the first two weeks there was some rebuilding of air pressure under the skin, thus showing that the leak was still present, but gradually this was reduced. The patient was discharged on March 26, 1939. At that time the emphysema was practically gone, except for a small amount which could be palpated in the region over the left scapula. Figure 2 shows the patient completely recovered following treatment. The dog has remained normal ever since.

A New Method of Detecting Canine Diabetes

Announcement is made by the Denver Chemical Mfg. Co. that they have succeeded in developing in their laboratories a new, dry micro-reagent for making instantaneous tests for sugar in urine and which will be entirely practical for adoption as a means of making regular tests for glycosuria in canine patients.

Galatest consists of a compound in powder form. Its use is simple and easy. A small quantity of the powder is deposited on some dry surface and, with a medicine dropper, one small drop of urine is allowed to fall onto the powder. The reaction is instantaneous. If sugar is present, it will reveal itself in degrees varying from 0.1 percent to 1 per cent and over. It is quick, accurate, and inexpensive.

Contrary to former beliefs that only *Brucella melitensis* is capable of causing brucellosis in goats, the caprine and ovine species is susceptible to natural exposure to *Br. abortus bovis.—Meurou and Pineau.*

Critical Studies of Bang's Disease by a Practitioner*

THE FOLLOWING is an abstract from a thesis on Bang's disease written by a practitioner competing for the Thierry prize for 1938 and presented to the French academy of veterinary medicine. The thesis was analyzed by M. Chrétien of the academy, who recommended to the deciding commission that "The report is a résumé of a methodical observation of a practitioner who knows how to observe facts and interpret results." An abstract of the review follows.

When facts about the various infectious abortions are recited, Bang's disease is set down as the one most frequently observed in cows. But, inasmuch as there are other infections that cause abortion, "bovine brucellosis" is proposed as the exclusive name for the form caused by Bang's bacillus.

In regard to the course of the affection in a herd, a series of examples are cited as to the time after infection that the disease manifests itself by the principal symptom—abortion. That feature event may arrive early or more or less remotely. In some cases animals may begin to abort shortly after the introduction of an infected animal into the herd, while in other instances a year may elapse before any abortions occur.

Sometimes the infected females gave birth to calves only to abort during the next gestation. This discordance in the time at which abortions appear is attributed mainly to the virulence of the infectious agent but individual resistance had a certain degree of influence on the time element.

In the study of individual resistance it was seen that in newly infected herds, the tuberculous animals were the first to abort. Similar observations were made on animals infected with other organisms (streptococci and colibacilli). In fact, animals with low resistance were the first victims. Breed was not found to be a factor, nor does the elimination of vitamins by lactation appear to favor the spread. The infection spreads more rapidly in stabled than in pastured animals. In animals confined to the stable and tested every two months, it was observed that close contact (neighbor to neighbor) was a governing factor in the order of attack, and that it may require a year or more for ten out of twelve cows to present positive sero-agglutination.

In these series of observations, it was found that the agglutination titre augmented as the abortion event approached and that the maximum reaction was reached during the second fortnight after the premature birth. The reaction then gradually decreased and sometimes disappeared completely. When such cows were rebred, the agglutination titre began to augment again at the fourth month of gestation and so on through the next cycle.

In studies for the clinical characteristics which aid in diagnosis, it was observed that cows usually aborted during the sixth to the seventh month of gestation. When the afterbirth was expelled normally, the cows were not sterile, but retentions in which the envelopes showed the typical dirty, yellowish color were frequent.

The author points out that a diagnosis is difficult to make with certainty from the first abortion occurring and, on that account, prompt resort to indradermal or blood testing is essential. As a rule, the reading of these two tests runs parallel. Discrepancies between them may be due to the material used. The brucelline may have been prepared from nonspecific strains of the organism. When the diagnosis has been confirmed, prompt measures should be taken without delay. Intravenous chemical treatment, said to be effective in ewes, did not give recognizable results in cows. Wheat germ oil was not used extensively enough to draw conclusions.

BIOLOGICAL TREATMENT

In the use of bacterins (killed cultures) preference is given to those prepared with a lanolin base. These products seem to give

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some favorable results in pregnant cows negative to the agglutination test. They appear to have little influence on pregnant positives, regardless of the duration of the gestation at the time the treatment is given.

Premunition with live-culture vaccines is preferred, or a combination of the two may be used. The cultures from which vaccines are made should be obtained from the infected herd or, at least, from the region, but always it is first necessary to detect the sound and the infected animals before any treatment is attempted.

Sound, nonpregnant cows received two doses of living vaccine at a 15-day interval. Infected nonpregnant cows received but one dose. In either instance, the cows were bred between the second and fifth month following the injection. For pregnant cows, two injections, ten days apart, were given before the fifth month of gestation. After a normal or abnormal parturition, the animals, being then in the nonpregnant category, were treated as recommended above.

Thus, in a series of 201 cows premunized in contaminated stables where a certain number of the animals were reactors, only seven aborted. Of these seven, one was a heifer negative to sero-agglutination before treatment and the other a cow that had delivered a normal calf at the preceding parturition.

The thesis contains interesting tables showing precisely the results obtained from each and every intervention from the moment of making the diagnosis until parturition. It is pronounced an exceedingly creditable research for a practitioner.

The value of this report lies in the regularity of making the tests, to keep informed precisely on the march of the infection throughout the entire period of the research. It is also significant from the standpoint of the author's evaluation of the intradermal and agglutination tests used concurrently to check the one against the other. A justifiable criticism of the work is the writer's failure to describe the method of preparing the vaccines and the degree of attenuation, which the reviewer (Chrétien) does not hesitate to point out.

Psittacosis, An Occupational Disease of the Veterinarian*

Writing in *Bulletin de la Société de Médecine* de Paris, Thaleimer describes a clinical case of psittacosis in a veterinarian, contracted by contact with a parrakeet affected with the disease, notwithstanding that the cages and birds were handled with rubber gloves. The symptoms were typhoid, mobile pulmonary localizations, leukopenia, polynuclosis, and protracted illness. Recovery occurred after a long period of convalescence. The ailment, at first baffling to the physicians, was finally diagnosed by the inoculation of mice.

Further inquiry into the case revealed that two employés of the railway station who handled the birds in transit were stricken with the infection. One of them died.

The author mentions also an outbreak in a department store where parrakeets were given as prizes. The director of the store and an employé died of the disease. Another case was that of an artist who borrowed a parrot from a bird store as a model for a painting. Both he and the owner of the store died.

Magnesium Sulfate in Azoturia

Stupefying doses of magnesium sulfate given with morphine hydrochloride intravenously are rated highly as a calmative in serious cases of azoturia, or hemoglobinuria, as it is more properly named. The dose is 25 cc. of a saturated solution of the magnesium salt and 25 cgm. of morphine. If the calmative action is incomplete the dose is repeated. The long duration of the sedative effect and the specific action of magnesium sulfate on the spasmodic musculature are the bases of the treatment. The treatment is described by Capt. Bontems (*Revue de Médecine Vétérinaire, Jan., 1939*) in the report of a case that recovered after being down 14 hours.

*Revue de Médecine Vétérinaire, xc (Feb., 1938), p. 113.

Equine Obstetrics Case: Anterior Presentation

By CHAS. H. HAASJES, D. V. M.
Shelby, Mich.

I BELIEVE that the readers of our national journal will find interest in an obstetrics case I handled recently. The patient, a 5-year-old Belgian mare, was in her second pregnancy, with considerable edema of the abdomen, running forward from the thoracic cavity. The mare had been in labor for only one-half hour, and had not been interfered with in any way.

The examination revealed that in spite of heavy expulsive efforts, the fetus could not be removed. It was twisted slightly to one side. The genital tract was well lubricated with fetal fluids.

The fetus was rotated to a dorso-sacral position and traction applied. However, the progress ceased when the withers appeared. The fetus seemed to be pressing against the maternal sacrum, and further traction was of no avail.

Further examination revealed that one hind foot of the fetus was on the floor of the pelvis beneath its abdomen. Epidural anesthesia was employed to control the violent straining and prevent prolapse of the rectum. Repulsion of the hind foot was not attempted because it was firmly impacted in the pelvic canal. It seemed impossible to repel it without danger of rupturing the uterus. The other hind limb could not be located.

By extracting it as far as possible, incising the thorax, and extirpating several ribs, the fetus was completely eviscerated. Further traction was applied in order to detruncate the fetus as far posteriorly as possible. A sufficient amount of skin was dissected back and the detruncation was accomplished between the thoracic and lumbar vertebra. An extraordinarily long repeller was used in an effort to turn the remaining portion into a posterior presentation. However, this proved to be impossible after an hour of effort.

A long piece of obstetrical wire saw was then tied to a bridle bit and carried over the back of the fetus and brought forward between the hind legs. To protect the uterus from injury, a piece of inner tube was used to enclose the two wires. The hind quarters were separated in this manner and each quarter removed.

The operation required three hours. The mare was somewhat tardy in recovering but now has a good appetite. The vulva will be somewhat constricted due to injury and will probably interfere with breeding.

Chloralization for Equine Anesthesia

In an article* glorifying chloral hydrate in equine surgery, Prof. Goffinet of the veterinary school of Brussels puts this drug at the head of the list of anesthetics. Intravenously, the anesthetic can be given in the standing position. The patient lies down gently and, as the knees and hocks flex in the act, it can be guided to drop on the side desired. There is no excitement, anguish or struggling as the hypnosis gradually establishes itself. It enables the operator to start immediately without loss of time and to proceed tranquilly.

The state of anesthesia is recognized by lateral oscillations of the eyes and slowing down of the respiration. The awakening is announced by movements of the legs and head, the duration varying from one to two hours, at which time the horse can be rolled to the sterno-abdominal position, given a lift and conducted to its stall.

The period of revival can be shortened by an injection of 0.60 to 0.90 grams of cocaine dissolved in 20 cc. of water. The method is inexpensive, practical, inoffensive, and is constant and rapid in its effects.

According to the author, the irritant action of chloral on the subcutaneous and perivascular tissue when the needle is accidentally misplaced has been exaggerated.

*Prof. Goffinet. Ann. de Méd. Vét., June, 1938.

Acute Hydrogastritis of Horses

By N. J. MILLER, M. D. C.
Eaton, Colo.

AMONG the various intestinal disturbances of horses recognized by the veterinarians of northern Colorado is one which is characterized by the accumulation of a large quantity of fluid in the stomach, and which for want of a better name has been called acute hydrogastritis. A review of all available literature fails to reveal a description of this condition. We have no knowledge of its geographic distribution, but assume that it may exist in other localities. Autopsy reveals that this dilation is always accompanied by a varying amount of acute inflammation in the duodenum. Therefore, we may be designating a result rather than the cause, but the name seems to describe the condition, and hence its use. Acute hydrogastritis should be recognized as a specific malady and, except in the very early stage, should not be difficult to diagnose.

CAUSE AND OCCURRENCE

To the writer's knowledge the cause of this condition has never been determined. It has been seen in horses pastured on native grass, and in early spring in horses pasturing on winter wheat, as well as those receiving either cane, millet, or alfalfa as forage. It also has been seen in the fall in horses pastured on alfalfa and grain stubble and beet tops. It has been observed to occur more frequently during the summer months, but has been recognized during all seasons of the year. Therefore, feed and weather conditions apparently do not have much bearing on the cause.

PATHOLOGY

Autopsy reveals a ruptured stomach, from which an excessive amount of fluid has been liberated into the abdominal cavity. A severe catarrhal gastritis is observed, characterized by a tenacious mucus adhering to the gastric mucosa. Practically no food solids are present. No characteristic lesions are observed in the intestine except for a sharply defined inflammation of the duodenum at a point from one to two feet from the pyloric opening of the stomach. This inflammation may be just a narrow band or it may be a section 15 inches in length. But it is always present and is acute and sharply defined.

SYMPTOMS

There is nothing characteristic about the colicky pains in the early stages of acute hydrogastritis. As the accumulation of fluid in the stomach increases, however, certain definite symptoms are manifested. Difficult breathing because of the pressure of the dilated stomach against the diaphragm seems not in proportion to the amount of abdominal distention. Close observation will reveal that whatever abdominal distention exists seems to be confined to a springing out of the ribs, rather than a fullness of the flanks, as in intestinal tympanitis. The animal usually sweats profusely and because of the stomach distention does not remain long in a recumbent position. There is usually a desire to walk and paw or strike objects with the fore feet.

Rectal examination reveals a dry, sticky mucous membrane with the lower bowel containing a small amount of dehydrated fecal pellets. On palpation of the large colon, one usually finds the contents apparently normal as regards fecal contents and amount of gas present. Therefore, with the recognition that there must be a cause for the distressed respirations, examination forward and to the right of the median line will usually reveal the distended stomach, which ordinarily can not be palpated per rectum. Borborygmus and peristalsis are negative.

In most cases of acute hydrogastritis, when the stomach has become distended, the fluid is forced up into the esophagus and, in some cases, fluid containing stomach contents will be eliminated through the

nostrils. In all cases where fluid is present in the esophagus, there is noted a peculiar clicking or splashing sound when the animal attempts deglutition, which frequently it does. This is also noticed in some horses during exhalation. The sound is very diagnostic and, once recognized, will aid materially in the diagnosis of future cases. Fluid is not present in the esophagus in all cases, however, and thus this symptom must not be depended upon.

When the stomach tube is passed, the fluid usually will start to siphon. It may be necessary, however, to prime the tube, so to speak, to start the flow even when the stomach is greatly distended. The fluid is usually of a more or less thick, amber color, sometimes the consistency of syrup, having a distinctive odor and containing some food solids. If the distention of the stomach has been severe and has existed for some time, the fluid may be stained with blood and will have a reddish color. As much as twelve to 14 gallons of fluid may be drained from the stomach of a large horse.

Draining the stomach seems to give complete relief, except in those cases in which the stomach refills in a few hours.

TREATMENT

After the stomach has been drained, it is well to pump in one or two buckets of water and drain again. This is followed by the introduction of one or two gallons of water in which has been dissolved eight to twelve ounces of powdered aluminum sulfate and the contents of one equine aloin purgative capsule, as well as a liberal dose of guaiacol compound, or some antiferment. Alum is specific for this condition and should be given in half-pound doses or more. The administration of an astringent and a physic together does not make sense on paper, but it works in the horse. The draining of the stomach without the use of alum will be followed by failure, as the stomach will refill in two to six hours, and true gastritis usually follows. The use of alum has reduced the death loss from 100 per cent to about 10 per cent in the writer's practice. Success usually follows the first treatment, and in those cases where the stomach refills following the treatment just described, the prognosis is usually unfavorable.

AFTER CARE

Feed of all kinds is to be withheld until bowel evacuation occurs and danger of refilling of the stomach is over. Water is allowed in small amounts for twelve to 18 hours and increased as favorable progress is shown. It is recommended that horses suffering from this condition be changed to our so-called native or timothy hay and continued on this feed for some time.

Phenothiazine

To the numerous effective anthelmintics discovered by the zoölogical division of the Bureau of Animal Industry, United States Department of Agriculture, add phenothiazine, the new treatment for nodular worms in sheep and swine, erstwhile incurable helminthiases. The drug is also an effective ascaricide.

Phenothiazine is a grayish-blue powder, insoluble in water but sufficiently edible in medicinal strength to be given effectively in feed. In an address before the Georgia State Veterinary Medical Association last month, L. E. Swanson of the federal service at Moultrie, Ga., lauded the merits of the new treatment, confirming reports previously published on the anthelmintic properties of that drug. Phenothiazine is a powerful insecticide, used to combat plant parasites.

Sero-Diagnostics on the Range

In Oregon, we recognize that the testing of range cattle for Bang's disease is a controversial question. However, from the economic standpoint of live stock sanitation, it pays. It may be purely a matter of opinion—like the worker who visited the doctor and, when questioned as to what he ate and drank, stated that among other things, "I drank 18 cups of coffee." Asked if the coffee didn't keep him awake, he answered, "Well, it helps." *(W. H. Lytle, 42nd Annual Report of the United States Live Stock Sanitary Association.*

Hog Cholera Immunization in Pigs on Low Vitamin-B-Complex Intake

By E. H. HUGHES and H. S. CAMERON, M.S., D.V.M.
University of California, Davis, Calif.

IT HAS been demonstrated by Hughes[1] that pigs do not develop normally when on a diet in which some factors in the vitamin B complex are absent or present only in very small amounts. The basal diet in his experiments consisted of rice screenings, purified casein, cod liver oil in sufficient quantities to protect the animal against deficiencies of vitamins A and D, and an adequate salt mixture. This diet was deficient in thiamin, riboflavin, nicotinic acid, filtrate factor, and vitamin B_6. In addition to producing unthriftiness, anorexia, and lack of growth, pathological conditions, such as mild gastroenteritis and occasional ulcer formation in the intestine, were observed at autopsy of animals that had died while on the experimental diet.

The addition of factors in the vitamin B complex, particularly nicotinic acid, resulted in an immediate increase in the rate of gain, improved the appetite, and lowered the mortality rate. The possibility occurred to the authors that pigs vaccinated while on the basal diet would not be immune to hog cholera, and that some of the so-called breaks could be explained on these grounds. This paper is a report of experiments made to determine the influence of low vitamin B intake on the efficiency of serum and virus immunization against hog cholera.

Six 11-week-old pigs from three sows were placed on the basal diet. Forty-eight days after going on the ration, one died. The autopsy findings were as follows: The general condition of the carcass was fair, the heart flabby, and the mucous membrane of the pyloric portion of the stomach inflamed. The stomach contained much feed. A catarrhal exudate was observed in the small intestine. The rectum contained a small amount of dry and sticky feces. Two ascarids were found in the intestine. All other organs were apparently normal. These findings were in agreement with those observed in the original work of Hughes.[1]

The remaining five pigs were vaccinated with serum and virus 52 days after going on the deficient ration. The average gain in weight for these five pigs over that period was 11.4 pounds. Six weeks after vaccination each pig was inoculated with 5 cc. of virus known to be potent. They were maintained on the basal ration for three months after vaccination, over which period the gain averaged only 2.4 pounds. At the end of this period they were given rolled barley and alfalfa hay for a week, during which time the gain averaged 9.8 pounds per animal. None developed hog cholera.

In an effort to determine whether or not an immunity produced before the animals were placed on the ration would persist, a group of six pigs were immunized with serum and virus two weeks prior to weaning. Seven days after weaning they were placed on the ration and, one month later, inoculated with 3 cc. of a potent virus. No hog cholera resulted. Although in this second experiment a month on the basal diet may appear too short a period to affect the immunity, the rate of gain, which for the month averaged a total of only eight pounds, whereas other pigs in the same experiment fed a diet containing the factors of the vitamin B complex gained 48 pounds in the same time, indicated that the animals were already affected by the lack of factors of the vitamin B complex.

The restricted diet of these pigs was probably more drastic than would be found under most field conditions and, consequently, provided a more severe test, as far as vitamin deficiency is concerned, than could be obtained in the field. On the other

hand, it should be pointed out that these pigs were maintained under better hygienic conditions than is usually encountered in herds where the diet is deficient. The experiments, although conducted with too few animals to warrant definite conclusions, indicated that the immunity produced by serum and virus in pigs on a low vitamin-B-complex intake, was solid, where other conditions were satisfactory.

Reference

[1]Hughes, E. H.: The vitamin-B complex as related to growth and metabolism in the pig. Hilgardia (Calif. Exp. Sta.), xi (1938), pp. 595-612.

China Berry Poisoning in Hogs

By J. H. BROWN, D. V. M.
Tarboro, N. C.

A CLIENT with a herd of 50 Chester White hogs weighing from 125 to 150 pounds one morning reported five hogs sick and requested the writer to call. These animals had been vaccinated at the age of 10 weeks and had been thriving. The herd was grazing a clover field and had access to a wood lot through which a creek flowed. The evening before, the caretaker had reported that all hogs seemed to be in a normal condition.

The sick hogs were found lying on the side of a hill adjacent to the creek. It had rained the evening before and the ground was moist. Three of the animals were able to get up and stagger away, but soon they lay down again. The remaining two were in a comatose condition and were lying on the side with the head downhill. Respiration was slight. The temperature was 95° F. The abdomen and mucous membranes were normal.

One of these hogs was slaughtered by bleeding. The blood had a slight purplish tinge to it. There was some congestion of probably one-fifth of the lung. All of the organs of the abdominal cavity, both serous and mucous surfaces, seemed to be in a normal condition. The stomach was filled to capacity. One-fourth of the ingesta around the walls of the stomach was grass and clover; the remaining three-fourths, and this was in the center, was gritty and grayish brown, with purple specks of material scattered throughout. Small stems could be recognized and the gray capsule of some seed with stem attached was noted.

It was determined that this material was the masticated seeds of the China berry (*Melia azedarach*). A China-berry tree loaded with berries was in the pasture only 200 yards from the spot where the sick hogs were found. The herdsman, on being informed of the findings, remembered that he had seen a few hogs eating under this tree the previous evening. Probably the rain had brought down an abundance of the berries and only these five hogs had feasted, thereby obtaining an unusual amount.

The China berry is listed by authorities as being poisonous. People through the country speak of it as having vermifuge qualities, but the writer can not vouch for this. The tree is widely distributed through eastern North Carolina, and stock have ready access to the berries in many places. This is the first time that the writer has noted any ill-effects, probably because the berry has a bitter taste and is not often consumed in large quantities. An inner capsule of the seed is purplish and this is probably the source of the color observed.

Later, the owner reported that all of the sick hogs had made a recovery. Even the remaining one, left in a comatose condition, was able to get up the evening of the same day, and three or four days later appeared fully recovered.

Radium

It takes a million pounds of high grade ore to make one gram of radium, the price of which is now about $25,000 a gram. The total world supply of radium is 600 grams, or less than a pound and a half, valued at $15,000,000. Of this amount, says *Clinical Medicine*, 225 grams are in the United States, although all of it can not be located. Eastern hospitals have about 50 grams between them but need 50 grams more. The deficiency in radium is said to be a great misfortune in the practice of medicine.

Stiff Lamb Disease in Michigan*

By L. B. SHOLL, B. S., D. V. M.

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DURING the past 15 years, exclusive of the current year, very few cases of stiff lamb disease have been brought to our attention. In a summary of 700 autopsies on sheep and lambs,[1] the author lists only seven cases. In the spring of this year, 15 autopsies were performed on stiff lamb disease cases and reports of large losses were submitted by veterinarians and farmers of Michigan. The loss was very heavy, some farmers reporting the loss of almost 30 per cent of the lamb crop. The sudden large outbreak has brought about a concentrated effort to find some means of treating sick lambs and preventing future occurrence.

The past fall was unusual in that sheep were allowed to remain on pasture much longer than usual. This spring was unusual in that April was very cold and rainy. Flocks were kept in the barn longer than has been the practice.

All farmers bringing affected lambs to the laboratory were consulted as to the occurrence and the nature of feed and handling. In practically all cases the disease appeared while the flock was still in the barn. Two farmers reported that no more cases developed after the flock had been put on pasture. Most of them reported that the disease apparently affected only single lambs and that the largest, most vigorous lambs were the first ones affected. No cases occurred in orphaned lambs raised on bottles. Practically all of the animals brought in were 3 to 4 weeks of age.

Each farmer was carefully questioned as to the feed being used. In order to give some idea of the wide variety, some of these are listed below:

1. First-cutting alfalfa, ear corn, and oats.

2. Clover and alfalfa, corn and oats.

3. Alfalfa and mixed hay, bundle corn, bran, oats, and soy bean meal.

4. Hay alone, mainly alfalfa.

5. Alfalfa and mixed hay, bran, oats, and soy bean meal.

6. Clover hay; no grain.

7. Alfalfa and clover hay, cornstalks, silage, wheat, and oats.

8. Clover hay, oats, and corn fodder.

9. Alfalfa hay and barley.

10. Alfalfa and timothy hay, barley, oats, and cornstalks.

The condition of the ewes as reported by the owners varied from medium to very good. Some reported plenty of exercise while others apparently had given the flocks very little. Most of the reports indicated that the lambs were affected in the hind legs first.

Autopsy findings were always very similar. The main variation was in the extent of involvement. The skeletal muscles showed variable amounts of characteristic degeneration, bilaterally symmetrical in distribution. Subendocardial lesions varied from very small, light grayish-white patches to large diffuse areas. The rumen was nearly always filled with feed, consisting almost entirely of hay. The abomasum usually was quite empty. The kidneys showed some degenerative changes. The cortex was light and mottled. There was mild congestion.

Based on the fact that rations were so variable and that the more vigorous lambs were affected, the author worked on the theory that the condition might be associated with the apparently rather sudden change from milk to solid feed, consisting mainly of roughage. The sudden widespread occurrence this year is difficult to explain. No cases have occurred in the college flock. These lambs have access to concentrated, ground, mixed feed.

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Two severe cases brought in were fed cow's milk. They also had pneumonia and died. Two other lambs brought in April 26 and 30 were fed whole milk with a bottle. Both were still able to walk a little, and both were returned to the farmers a few days later in apparently normal condition.

Blood chemistry determinations revealed low creatinine and high non-protein nitrogen. The author believed that possibly a high protein diet was needed, and at the suggestion of C. A. Hoppert of the chemistry department, gelatin was added to the milk. C. F. Huffman suggested the use of wheat germ oil, found by experiments on rats to contain muscular dystrophy factors. The following are three cases that received whole milk, gelatin and wheat germ oil. All showed marked response.

Case 1: The lamb was a large, well developed grade female, 4 weeks old. She was a single lamb. The owner brought her in on May 8 with the history that she had been unable to stand for two days. Feed had consisted of alfalfa hay and barley. When lifted to her feet, she would stay up for only about 15 seconds. The rear legs were unable to support her. She was fed 1.5 ounces of 10 per cent gelatin and 4.5 to 5 ounces of milk three times a day. About 0.5 dram of wheat germ oil was added to each feed. In two days she was able to stand for considerable periods of time. Rapid improvement followed. During the day she was put out on grass and, on May 16, she was apparently a normal lamb. She was returned to the farmer.

Case 2: The animal was a grade female lamb, 4 weeks old, brought in on May 12. Before lambing, the feed consisted of whole oats, cull beans, shelled corn, and some alfalfa. Some bundle corn and soy beans were also fed. After lambing started, the feed consisted of oats, cull beans, shelled corn, wheat bran, silage, and alfalfa. The flock had plenty of exercise. Some trouble occurred while the flock was in the barn, but it continued to appear for three to five days after the flock had been put on pasture.

The lamb was down. When attempts were made to put her on her feet, the legs showed extreme trembling and were entirely unable to bear her weight. She was fed in the same way as case 1. On May 16, she could stand for short periods when put on her feet. On May 17, she was able to get up and walk. Much improvement was noted each day and, at the time of writing, she is practically normal.

Case 3: The animal was a grade female lamb, 3 weeks old, brought in on May 16. The flock was in the barn until May 6. Plenty of exercise had been furnished. Feed consisted of mixed hay, oats, and some cull beans. The lamb was scarcely able to stand. Pneumonia also was present. She was fed in the same way as the other two. At the present time the stiff lamb disease symptoms have disappeared and the lamb is still being treated for pneumonia.

The author realizes that the material herein presented is too meager to warrant definite conclusions. It is submitted as a preliminary report to suggest a possible solution for this important problem. If the ideas of the author are correct, the condition should be prevented by supplying palatable concentrated mixed feed for the lambs rather than allowing them to eat large quantities of hay. Experiments are now being planned with the idea of making a more thorough study of the problem next spring.

Reference

[1]Sholl, L. B.: A summary of 700 autopsies on sheep and lambs. Jour. A. V. M. A., xciv (1939), n.s. 47 (6), pp. 663-664.

The domestication of animals is one of man's undertakings that stretches beyond the nightfall of a prehistory that will never be written, and with that undertaking grew the art of animal husbandry and veterinary science.

In premunizing cows against Bang's disease (live culture vaccination), the cultures should be made from the herd treated, or at least from the same region, in order to obtain maximum benefit from that preventive measure.—*Demont.*

LEGAL OPINIONS

By JOSEPH M. KOTZ
Attorney for the Association

The text to follow tells a significant story from legal life about a promising undergraduate who entered a career as a practitioner in advance of his constitutional day. For obvious reasons, names are omitted. The case in its impersonal aspect alone should prove edifying—particularly to undergraduates who, with no occupation for the summer months, might follow the same path of the young defendant in this case.

THE DEFENDANT was a student in a school of veterinary science. While at home during the summer vacation, he castrated colts for various persons, and on the occasion in question went to the farm of a neighbor to perform an operation of that nature. While he was there, another party (the plaintiff) brought a horse with a sweenied shoulder to him and asked him to treat the animal.

According to all the witnesses present and testifying on both sides of the case (except the plaintiff), the defendant made no claim to being a doctor of veterinary science, but stated that he was still attending school and had a good scholastic standing. The plaintiff alone testified that the defendant had claimed to be a veterinarian, but nowhere did he deny the statement of the other witnesses concerning the youth's attendance at school.

The man to whose farm the plaintiff brought the horse said that the defendant had told him and the plaintiff that he was not a veterinarian, but a student, and had not completed his course at school.

All agreed that the defendant had been reluctant to undertake the treatment and offered several excuses to avoid it. He finally consented, however, and made an incision in the atrophied shoulder of the animal and injected a quantity of turpentine. He advised the plaintiff to turn the horse out to pasture. The shoulder and body of the animal became swollen and inflamed, and the plaintiff incurred considerable expense in curing it. The defendant said that the turpentine injected into the shoulder of the animal did not exceed three-fourths of an ounce, while the plaintiff estimated the quantity at 24 teaspoonfuls. None of the other witnesses attempted to state the quantity.

Prior to the operation, nothing had been said about payment for the student's services. Although payment was offered after the services had been rendered, the young man declined it. The experts testifying in the case agreed that the injection of turpentine was a proper treatment but the quantity as stated by the plaintiff would be excessive, and probably produce injury.

In his petition the plaintiff alleged that the defendant had held himself out to the public as a skilled veterinarian and, as such, had accepted the case under dispute but performed the service negligently and unskillfully. He demanded recovery in the sum of $200. The defendant answered, denying the allegations of the petition.

The right to recover damages in an action of this character is based on the theory that the defendant has failed to discharge a legal duty which he owes the plaintiff, with the result that damage is incurred. The nature and extent of that duty, if any, depend on the circumstances under which the defendant undertakes the service. If he has held himself out to the public or to the plaintiff as a competent veterinary surgeon and, as such, has undertaken to treat the animal, he is bound by duty to employ the learning, skill, and care which characterize the profession generally in that vicinity. This duty is none

the less obligatory because he has performed the service without compensation.

Had the defendant claimed to be a veterinary surgeon, he would have been held by law to exercise the skill and care of veterinary surgeons practicing in his vicinity. Failure would make him liable in damages. Under this rule, the court held that if the defendant had told the plaintiff he is a veterinarian, even though he had stated his lack of skill and experience; if the plaintiff, with full knowledge of the defendant's status, had employed him to treat the horse; and if he had treated it to the best of his ability, he would be held to meet the same standard that is expected of a qualified veterinarian with good professional standing.

This case was heard by the Supreme Court for the second time and the decision was reversed in favor of the student. It was held that the first court had improperly instructed the jury. The Supreme Court stated, however, that were it not for the erroneous instructions involved, the defendant would have been liable.

Shipments of Live Stock

In his address before the 42nd annual meeting of the United States Live Stock Sanitary Association, John B. Gage, president of the American Milking Shorthorn Breeders' Association, classified state regulations on the movement of domestic animals from state to state as a "sort of economic tariff or barrier against such importations" and cited a number of court decisions upholding regulations which violate the clause in the federal constitution declaring that "the citizens of each state shall be entitled to all privileges and immunities of citizens in the several states."

The speaker's main contention was that intrastate and interstate transportation of live stock should be subject to the same regulations in the interest of all concerned. But, in the famous Wisconsin-New York case,[1] where an attempt was made to invalidate regulations prohibiting the importation of dairy and breeding cattle not certified to be free from Bang's disease by the proper officials of the state of origin, the Supreme Court upheld the validity of the New York regulations. In effect, the Court ruled that the New York regulations were not in conflict with the federal statutes, and that "much weight is to be given to the acquiescence of the federal government to the enforcement of state measures to suppress Bang's disease."

In this case, no objection was made on the ground that there were no restrictions on the local movement and sale of live stock by citizens of the State of New York. In another case[2] of the same genre the United States Supreme Court ruled that no privileges are granted to the citizens of one state that are denied to the citizens of other states.

Chicago's Horse and Buggy Problem Solved

Back in 1894, David Wallach, a prominent Chicagoan, died, leaving the city $5,000 with which to construct a combination drinking fountain and horse trough on the lake front.

But automobiles began to replace horses before the money was used. While there was no justification for adding to the supply of horse troughs, there seemed to be no method of evading the instructions in the will. Meanwhile, the heirs sued to collect $9,000 interest accrued on the bequest.

The city council solved the problem to the satisfaction of all concerned, however. They gave the heirs their interest and then turned the matter over to park officials, who, untroubled by the automobile age, have promised to build a handsome horse trough in one of the parks on the south side of the city—right by the side of a bridle path.

Plodding oxen recently took a place along with automobiles, speedboats, and airplanes on the lengthy list of confiscated liquor carriers. Sheriff's deputies at Jasper, Ala., reported two oxen seized in a raid nearby. They said that the animals hauled wood to the still and carted whiskey away.

[1]Mintz vs. Baldwin, 289 U. S. 346, 77 L. Ed. 1245.

[2]Reid vs. Colorado, 187 U. S. 137, 47 L. Ed. 108.

CURRENT LITERATURE

ABSTRACTS

The Virus and Visible Microbes of the Central Nervous System in Canine Distemper

It is generally known that in canine distemper the central nervous system is attacked after the dog has presented the catarrhal form of the disease or when the disease developed slowly. The nervous form of the disease has never been reproduced from virulent material collected from catarrhal cases, nor has it ever been reproduced in typical fashion by using nervous substance of dogs affected with the nervous form of the disease. That is why some authors believe that Carré's virus affects the brain directly, while others contend that the nervous trouble is caused by the microörganisms commonly found in the brain of the affected animal. The question arises, therefore, as to whether it is possible to provoke the nervous form experimentally by inoculation of cerebral substance of dogs affected with the nervous form from the onset, or secondarily.

The frequence and the nature of the bacteria encountered in the brain of affected dogs were studied. Speransky and Gisattulin were able to demonstrate that such brain substance was toxic. Hence, the author attempted to determine whether these toxic substances exist in the brain of dogs showing epileptiform crises and whether these substances are capable of producing such crises in dogs affected with the natural disease.

Ten dogs were injected subcutaneously with brain substance of dogs affected with the nervous form. Two contracted the disease, but only in the catarrhal form. The nervous form was reproduced once by intracerebral injection of brain substance taken from a catarrhal case. From the nervous substances of 20 dogs affected with the catarrhal form, the author isolated, in 15 of them, a short-chain streptococcus. In short, the toxicity of brain substance of dogs affected with the nervous form could not be demonstrated. However, after injecting such brain substances into healthy dogs subcutaneously, only a local edema was produced. The same inoculation into dogs affected with the nervous form of the disease aggravated the symptoms. *(E. Domarski. Waidomosci Weterynaryjne, xvii (1938). Abstract, Recueil de Médecine Vétérinaire, cxv (March, 1939), p. 170.)*

Ascites in Carnivores

Because of a special constitution of their tissues, ascites occurs frequently in carnivorous animals. It is one of the common diseases of the small animal clinic. Although seen at all ages beyond puberty, the incidence increases with age. Canine ascites is a form of edema—a humoral trouble consisting of a lowering of the osmotic tension of protein associated with increased concentration of chlorides. In other words, ascites is hypoproteinemia plus chloridemia associated with, or in the absence of, hepatic renal or cardiac lesions. These organic lesions, formerly regarded as the only direct factors, may contribute only to the nutritional modifications leading to the clinical development.

Except where the renal function is involved, the treatment consists of the evacuation of the accumulated liquid and the administration of calcium chloride in doses of 5 to 8 gm. daily for no more than five to six days. The curative action of this calcium salt lies in the abundant diuresis produced and the elimination of sodium chloride. It is thus that this chemical—itself a chloride—overcomes the too high concentration of chlorides.

According to the authors cited, calcium chloride is, however, of little value in cardiopathic ascites and is prohibited where there is functional derangement of the renal secretion. Its greatest value is in the humoral and hepatopathic forms. For cardiopathic ascites, in the absence of renal or hepatic trouble, mercurial diuretics are chosen in lieu of calcium chloride. In fact, the use of such mercurials as 440 B or salyrgan (salicylallylamide-o-acetate of sodium 10 per cent) is limited to dropsies of cardiac origin. These drugs are well tolerated and produce a profuse polyuria that makes the edema disappear rapidly without causing any distress. They are injected intramuscularly in doses of 0.5 to 2 cc. of a 5 per cent solution, in human medicine. Their value in dogs would depend upon making an accurate diagnosis of the given case of ascites. The popularity of the mercurial diuretics in human medicine for more than ten years and the dearth of reports on their use in canine medicine, notwithstanding the frequency of ascites in dogs, appear to be a gap in our therapeutics, even though the prognosis in any event is seldom favorable. *(Abstracts from three theses (Flusin, Lyon; Evard, Alfort; Fontan, Toulouse). Recueil de Médecine Vétérinaire, cxv (Mar., 1939), pp. 304 and 308.)*

Transmission of Bovine Contagious Pleuropneumonia

Lesions of contagious pleuropneumonia were produced by the intrajugular injection of agar plugs containing lymph or culture after an incubation period of approximately one week in susceptible animals. In resistant animals symptoms were vague or absent, even though well developed lesions occurred in the thorax. In five animals the lungs alone were involved, while in seven cases both the lungs and pleura were involved. Animals injected by the injection of virus into the thoracic cavity showed fibrinous pleurisy and no lung lesions, indicating perhaps that the lungs escape infection when the pleural cavity is primarily infected. Under practical conditions a considerable percentage of animals survive infection and a large number of them become "lungers." Immunity tests on vaccinated cattle consisted of the injection of shoulder lymph from a natural case of the disease added to an agar emboli. *(Experiments on the Transmission of Bovine Contagious Pleuropneumonia with a Report on a New Method of Testing Immunity Following Vaccination. By R. W. M. Mettam and J. Ford. Jour. Comp. Path. & Ther., liii (1939), p. 15.)*

Fowl Paralysis

Observations made on 227 chicks hatched and grown in isolation from the parent stock showed approximately 20 per cent incidence of iritis, which strongly suggests to the authors the transmission of the disease through the egg. High incidence of fowl paralysis in the control group indicated spread by contact. The incidence of iritis in the progeny of parents with iritis was found to be greater than in those from parents with normal eyes. Coccidiosis and parasitic infestations apparently played no part in the incidence of iritis in these experiments. *(Is Paralysis of Fowls as Manifested by Iritis Transmitted Through the Egg? By C. F. McClary and Charles W. Upp. Poultry Sci., xviii (1939), p. 210.)*

Johne's Disease

Johne's disease was found to exist in ten states during 1938, as was shown by about 4,000 tests made with either johnin or avian tuberculin. The percentage of reactors was 7.2. In some localities the disease appears to be a serious matter and measures to stamp it out are in order. The author recommends that further studies of this grave threat to animal husbandry be made and suggests the new federal government's research laboratory at Auburn, Ala., as the place to carry them out. Owners of infected herds are aware of its seriousness and are anxious to aid in its control and eradication. *(A. E. Wight, Chief, Tuberculosis Eradication Division, Bureau of Animal Industry, U. S. Department of Agriculture, 42nd annual report of the U. S. Live Stock Sanitary Association, page 225.)*

Enterotoxemia of Ruminants and Grass Tetany

Infectious enterotoxemia has been studied in rabbits and sheep, which are often stricken with that disease in the spring of the year. The infection, however, exists in other species of animals.

In 1926, Vawter and Records in the United States signalized a hemolytic icterus in cattle characterized by islands of hepatic necrosis in which they found the *Clostridium hemolyticus bovis*. In 1933, Scofield in Canada described a hemoglobinemic icterus in cows and observed the presence of *Cl. welchii* in the intestine of the cadavers. In a previous report, the authors mentioned the similarity of the symptoms, lesions, and conditions of certain forms of enterotoxemia of sheep and grass tetany in the bovine species.

In 1936, Albiston, found the toxin of *Cl. welchii* in the intestinal contents of cattle that had died of grass tetany and, during the same year, Rose and Edgar in Australia found in calves a disease comparable to the enterotoxemia of sheep seen in France, which was caused by *Cl. welchii*, type A.

Six to 24 hours before death, the patient refuses milk, is badly stricken, respiration and circulation are accelerated, the urine is colored a clear red, and the animal dies in great prostration. Sometimes, nervous troubles in the form of incoördinate movements appear. If an autopsy is made immediately, the carcass presents a more or less yellow color. The liver is friable, the kidneys are dark brown, and the first portion of the small intestine is congested or hemorrhagic. When the carcass has putrefied, the liver presents an accumulated bloody pigment around the centrolobular veins and fatty degeneration. The renal parenchyma is disarranged or infiltrated with hemoglobin. As Rose and Edgar also pointed out, the disease attacks calves about two months of age that are fed on skimmed milk or whey and turned out to a poor pasture. The calves, healthy enough at night, are found in agony the following morning, bloated from gas in the large bowel. The lesions in calves are those of enterotoxemia of sheep but lack the icterus.

The infection affects the caprine species. Important outbreaks in goats, corresponding in principle to the disease in the ovine and bovine species, are described.

Attempts to produce the disease experimentally failed. Sheep subjected to fasting followed by heavy rations of dry feed (alfalfa and oats) resisted large doses of *Cl. welchii* cultures. Evidently, it requires a greater nutritive disturbance to prepare the soil for such infections. *(Lesbouyries and Berthelon, Entero-Toxemia des Ruminants, Bulletin de l'Académie Vétérinaire de France, (Oct., 1937), 8, pp. 215-217.)*

Auto Taxation

The taxes levied on automobiles in England are a "bitter pill" for the veterinarian. For those who use high-power cars, the tax runs around a pound a week, which in American dollars would mean about $250 a year. "Then," quoting the author, "there is insurance, not to speak of petrol, tyres, and running repairs. By all means tax the *luxury* cars but ours are necessities—our calling is an economic and constructive state asset and, in consequence, we should not be penalized in carrying out our work. . . . What then is the remedy for this vicious state of affairs?" The author suggests that professional men should be allowed a substantial rebate on gasoline, as in former days when taxation "was only in the infantile, milk and water stage compared with the vitriolic phase it has reached in the latter days." *(Wm. Scott in The Veterinary Record, li, May 19, 1939, p. 629.)*

Shortage of Druggists

The Philadelphia College of Pharmacy announces a shortage of pharmacists in New Jersey, Delaware and Pennsylvania. The stringent entrance examinations, the four-year courses, and the rigid state board examinations, together with the business depression which drove pharmacists to other fields of their science, are cited as the causes of the shortage. *(Extract from Science News Letter, Feb. 25, 1939, p. 125.)*

BOOK NOTICES

A New Manual On Poisonous Plants

SINCE Pammel's last manual on poisonous plants was published in 1911, the veterinarian has had to gather information on this important subject from scattered bulletins issued from time to time by scientists of the United States bureau of animal industry. Because few troubled to file such documents, the practitioner in the field has received but little benefit from them.

Muenscher's new book gathers all of the facts of these documents and condenses them into usable form. As authors of such books are compelled to do the rather impossible thing of drawing sharp lines of distinction between what is and what is not poisonous in plant life, the reader is apt to find some omissions. These, however, are too few to be regarded as important.

Plants are classified according to family, and all of the plant families of the United States containing a number of injurious species are described. In elegant, condensed form, the author gives a clear description of the plant, its geographic distribution, the poisonous principles it contains, and the conditions under which the plants are injurious, the symptoms of intoxication, and the treatment.

A practical feature of the book are the indexes of the popular, as well as the botanical, name of the plants described. This feature will be appreciated by those who, for example, forget the botanical name of plants that cause milk sickness. Under the name of the disease, the reader is able to turn to the page where the plant is described under both the botanical and the common name. The fact that the index contains approximately 1,300 names gives a fairly good idea of the ground the author was able to cover, and the twelve pages of references should satisfy those who desire to study details.

The references cited in the preparation of this manual should be an assurance of its exactitude, and the brevity of the text meets the demand for a ready reference on poisonous plants that the veterinarian is apt to need from time to time. (*Poisonous Plants of the United States, by Walter Conrad Muenscher, Professor of Botany, New York State College of Agriculture at Cornell University. 266 pages, profusely illustrated. The Macmillan Company, New York, 1939.*)

The Clinical Use of Sulfanilamide and Allied Compounds

COMES a timely book on sulfanilamide, sulfapyridine, and allied compounds which grew out of the dye industry of Germany, when in 1908 azo-sulfonamide compounds were found to possess more fastness than the sulfonamide-free products. Thus, after many years, this finding led to the greatest therapeutic discovery in modern medicine —prontosil (1930). It was not until 1935, however, when Gerhard Domagk demonstrated that this relatively nontoxic red dye possessed remarkable antistreptococcic properties, that the therapeutic virtues of these compounds were realized.

This book of 320 pages of well-indexed material, covering the known facts about these products to date, opens with 13 pages of historical data which give a clear understanding of the steps leading up to the wide employment of these para-aminobenzene-sulfonamide preparations. In 1937, the council for new and nonofficial remedies of the American Medical Association named the group "sulfanilamide." Sulfapyridine, which has been heralded recently for its specific action against pneumococcal infections (in man), is "still under clinical investigation," although it "seems to possess remarkable therapeutic effects." One can recommend these 13 pages and its 59 references as the basis for all future studies of this sensational micro-

bicide which has come into the practice of medicine.

The chemotherapy of experimental infections includes critical studies of streptococcic, staphylococcic, gonococcic, pneumococcic, meningococcic, and various bacillary infections, taken from the vast field of experimentation so well cultivated in the past three years for both the prophylactic and curative investigations. Except in instances rare and vague, experimental virus infections do not yield to this treatment.

The 98 pages on the toxicity, pharmacology, and mode of action of sulfanilamide contain careful studies of overdosing, organic injury, contraindications, and the known dynamics of these products; and give the approved agenda for making the determination of the chemical in the blood and fluids. In regard to the mode of action, one can agree with the authors that "only a few observations stand out from the jumble of apparently conflicting data."

The confusion of names is pointed out as unfortunate. Among them are prontosil, neoprontosil, prontosil soluble, prontosil solution, rubiazol, *et al.* [The American veterinary supply houses still further complicate the terminology by offering sulfanilamide under trade names of their own.—Ed.]

Under "Clinical Toxic Manifestations," the authors lean toward the theory of relative safety and criticize physicians for being so hesitant as to let patients die from non-use. Yet, they devote 26 pages to warnings which make interesting reading for veterinarians, as here they corroborate the clinical reports of our literature, particularly in regard to the erythropenia and leukopenia so many veterinarians have observed from the too liberal use of sulfanilamide in dogs, cattle, and horses. In short, as the authors point out and emphasize, intelligent use rather than fear is demanded, if the rational use of sulfanilamide and its derivatives is to be developed.

This reviewer regards the book as a valuable documentation of an important subject, because sulfanilamide is destined to play a major rôle in the therapy of animal disease. Acquiring, consequently, meticulous knowledge of all of the details about its usage is nothing less than a sacred obligation of every veterinary practitioner. Bringing the scattered documents on this worthy remedy between the covers of a book together with an abundance of references was certainly a task everyone who practices medicine will appreciate. (*"Clinical Use of Sulfanilamide and Sulfapyridine and Allied Compounds," by Perrin H. Bond and Eleanor A. Bliss, both of Johns Hopkins University. 320 pages. The Macmillan Company, New York, 1939. Price, $3.50.*)

Parasites of Animals

The author of this excellent work sends an autographed copy, with his felicitations, to the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION. A glance through its pages shows that here is not an ordinary contribution to veterinary medical literature; and painstaking analysis of its arrangement and text bring one *vis à vis* a *chef d'ouvre* of extraordinary value. The regret is that such rich reservoir of knowledge on its three divisions (protozoölogy, entomology, and helminthology) is not written in a language familiar to the majority of our readers. Certainly such literature, in the course of time, will cultivate a thirst for an understanding of the two principal languages of the Americas. The JOURNAL thanks the author for this addition to its library. Its value as a reference is incomputable.

The parasitic enemies of man and animals belonging to the three sciences named above, so graphically portrayed, zoölogically classified, and minutely described as to their cycles of life, their geographic distribution, and their pathology, throw wide open the great question of man's precarious position in the animal kingdom—whether it will be he or the lower forms of life that will take over the captaincy of the world in the centuries to come. In such works as Dr. Pinto gives to his contemporaries rests the fate of mankind and of all higher life. For, man in his serene sense of superiority would be taken unaware to a subordinate position by visible and invisible killers were it not for the workers in these three

great branches of science who map out programs for their extermination or control.

The chapter on flies which deposit larvae into the flesh of higher animals, as portrayed in this work, may be selected alone as an illustrative example of the insect potential. It includes figures of men stricken to death about the eyes, nose, and mouth by genera of flies we can best understand by the depredations of our own screwworm menace in farm animals.

The section on protozoölogy, although more extensively documented than books written for semitropical and temperate climates, reminds one of protozoal infections, heretofore, and probably now, overlooked among the animals filing through the veterinary clinic. Texas fever, malaria, anaplasmosis, dourine, Weil's disease, *et al* are by no means tropical, and others, after surmounting the tropical barrier through the numerous means of modern transportation, may be worthy of attention.

The section on helminthology, comprising more than one-half of the volume, contains the conventional classification, life cycles, diagnostic methods, and pathology of approximately the same helminths (nematodes, cestodes, and trematodes) of North America familiar to the modern veterinarian. The book is outstanding for the drawings portraying life histories. The ones showing the ways of the hookworm in man and dogs and of trichinella in swine, rats, and man are exceptionally striking. It is worth nothing that the author points out the eating of rats by swine as enemy No. 1 of the trichinosis problem, ahead of the eating of uncooked sausage. The disease, however, does not exist in the swine of Brazil. But, the descriptive drawings showing the romance of our old friends, *Taenia saginata* and *coenurus*, are no less sensational and edifying.

The book is not a veterinary parasitology *per se*. It dwells upon the parasites of higher life, keeping the human side uppermost in mind without slighting any one of the domestic animals.

And what a bibliography! The hundreds of articles and books listed as references must certainly be a veritable paradise for the parasitologists. Among them are the American authors and journals and books—names familiar to those who read.

The volume concludes with the author's "*planos de combates*" prefaced with a paragraph complimenting the late Maurice C. Hall and his book entitled, "Control of Animal Parasites" (1932), which, as American veterinarians know, presents the subject in the form of military strategy. The chapter takes the reader through plans for fighting parasites based upon their mode of life and the vulnerable point of attack—plans which can be perfected only through knowledge of the creatures we feign to destroy. *(Zoo-Parasitos de Interesse Medico e Veterinario (Parasites of Animals of Interest to Physician and Veterinarian). By Dr. Cesar Pinto, 382 pages, extensively illustrated. Pimenta de Mello & Company, Rio de Janeiro, Brazil, 1938.)*

The Homing Pigeon

On account of former and new uses of the homing (racing pigeon), interest in this bird of sport and utility for civil and military purposes has increased. The facts stated in "Animals That Make the News" for the July issue, are corroborated in *Le Pigeoin Voyageur*, a booklet by Dr. Raymond Zaepfael giving the natural history, anatomy, alimentation, breeding, contests, diseases and their treatment, military and civil usage, legislation, flight, and orientation. All of the known facts about this useful bird are crowded into this volume. The foreword was written by General Gourard and the president of the national federation of columbophiles, Louis Palliez. The book is intended to, and obviously does, meet the approval of the amateur, the breeder, and the professional of the columbophile art. *(Le Pigeoin Voyageur, by Dr. Raymond Zaepfael. 182 pages, with 38 illustrations. Maison Rustique (Paris), 1939. Price, 12 francs.)*

No man can read with profit that which he can not learn to read with pleasure.—*Potter.*

THE NEWS

The JOURNAL Salutes

Gillmann—Campbell—Carpenter—Patton

The Veterinarians of the Month

Gillmann's Work on Convention Plans Is Outstanding

John H. Gillmann of Memphis, Tenn., chairman of the Committee on Local Arrangements of the 76th annual convention of the Association, has put a lot of hard, productive work into the very big task of planning and correlating the five-day program of activities. He certainly deserves a round of applause from A.V.M.A. members and veterinarians in general, because he has shown on this job the kind of leadership and enthusiasm that inevitably brings an enterprise up to the top—and keeps it there. If the 76th convention doesn't prove to be the most successful yet, it definitely will not be the fault of Gillmann or any of his co-workers.

John H. Gillmann

Just one of the many features planned by the Committee is a half-day outing on the Wilson plantation (a real southern barbecue and entertainment by negro singers), across the Mississippi from Memphis in Wilson, Ark. Working with Dr. Gillmann on the organization of the meeting are J. W. Scheibler, vice-chairman, and C. L. Allen, secretary, both of Memphis.

Dr. Gillmann, a graduate of the Saint Joseph Veterinary College, class of 1917, has been a member of the A.V.M.A. since 1926.

"Veterinary Medicine" Celebrates 400th Issue This Month

Captained by D. M. Campbell of Chicago, Ill. *Veterinary Medicine* commemorates with its July issue the 400th number of publication. In this Jubilee issue there are messages of congratulation from the leading veterinary editors of this country and abroad and from leaders in every branch of American veterinary service, including the B.A.I., the army, education, research, and practice.

D. M. Campbell

Dr. Campbell has edited and published *Veterinary Medicine* practically all the time since his graduation from the Kansas City Veterinary College in 1907. Other publishing experience includes a country newspaper and a national golf magazine. He is co-author with L. A. Merillat of "Veterinary Military History of the United States," published in 1935.

For a time, Dr. Campbell taught chemistry, pharmacy, and the language of medicine at Kansas City Veterinary College, and later taught chemistry, physics, and veterinary jurisprudence in the Chicago Veterinary College. At one time he was engaged in general practice in Oklahoma and in Kansas and, later, in small practice in Illinois. His commercial work comprises service with the Abbott Laboratories as head of their veterinary department (1910-13), and municipal food inspection.

Dr. Campbell has been a member of the A.V.M.A. since 1909. He attended the Kansas City meeting of the Association in 1907 and has missed but two or three meetings since. He has served on numerous committees, being at present chairman of the Committee on Public Relations.

Cliff Carpenter Heads A.V.M.A. Day at World's Poultry Congress

A heap of felicitations are in order for enterprising Cliff D. Carpenter of Fort Wayne, Ind. Coming to the front in a really big way for the poultry interests of veterinary medicine, Cliff has succeeded so thoroughly in promoting A.V.M.A. Day at the coming World's Poultry Congress (Cleveland, Ohio, July 28 to August 7) that this event now looms foremost among the highlights of the Congress.

Cliff D. Carpenter

Dr. Carpenter recently joined the staff of Allied Mills, Inc., Fort Wayne, Ind., as pathologist in the educational department of the company. In his work, he is closely associated with many well known authorities on nutrition.

After graduating from Cornell University in 1920, Cliff spent three years at the University of California Experiment Station, and then resigned to establish the first private laboratory in the United States devoted exclusively to the control of poultry diseases. In 1935 he was poultry pathologist with the Lederle Laboratories in New York City. Before joining Allied Mills, he was engaged in research work for about one year at the University of Kentucky.

Cliff has been a member of the A.V.M.A. since 1921.

Patton's Finding on Fright Disease Attracts Wide Attention

In the June issue of *Veterinary Medicine*, John W. Patton of East Lansing, Mich., announced the discovery that fright disease in dogs is caused by a deficiency of vitamin B_1 and responds immediately to a hypodermic injection of thiamin hydrochloride (pure crystalized vitamin B_1). The disease is effectively prevented by a ration containing an adequate quantity of vitamin B_1. In the early stages, while the digestive tract is still functioning, the administration of thiamin chloride cures the ailment promptly.

The announcement of Dr. Patton's important discovery was carried in an Associated Press dispatch of June 9 and very widely published in newspapers all over the United States. Following that, *Science News Letter*, *Science Digest*, *Time*, and other weeklies carried the story. The July issue of the dog press also devotes space to it. Altogether, the story has been circulated to more than 45,000,000 readers, bringing Patton approximately 5,000 letters asking for more information than that contained in the newspaper and magazine dispatches.

Dr. Patton holds a B.S. degree from Michigan State College; a D.V.M. from the School of Veterinary Medicine, Texas A. & M. College, and an M.S. from Kansas State College. In addition, he has taken special courses at the Michigan and Kansas colleges and at Massachusetts State College and Columbia University. His positions with educational institutions and in state work include: Agricultural Extension Service of Texas; Health of Animals Branch, Experiment Farms, Ottawa, Ont.; assistant professor of animal husbandry, Massachusetts State College, and assistant professor of physiology and pharmacology, Michigan State College. For eleven years he has been studying and investigating canine nutrition, and during the past seven years has devoted most of his time to that line of investigation.

John W. Patton

Dr. Patton has been a member of the Association since 1921.

Associated Serum Producers Launch New Educational Program

Live stock diseases of hot weather months are now being featured in a series of special publicity releases to newspapers and radio stations by the Associated Serum Producers through their educational bureau, the American Foundation for Animal Health.

The releases invite attention to seasonal diseases and convey to the farmer the importance of calling the veterinarian for reliable diagnosis and treatment should suspicious symptoms become evident.

COMMENCEMENTS

Alabama Polytechnic Institute

At the 67th annual commencement exercises of the Alabama Polytechnic Institute, held on May 28, the following candidates were presented for the degree of Doctor of Veterinary Medicine by Dean I. S. McAdory:

William R. Beasley
Cadwallader Brock
John W. DeMilly, Jr.
David E. Gibbs
Ben S. Huston
George M. Johnson
Carl H. Jones
Harry M. Kroll
Wilkie H. Lee
Ralph W. Marsh
Edward D. Marston
Myles S. Piper
Charles B. Plummer, Jr.
Mac Rachman
Malcolm J. Rattray, Jr.
Harvey L. Rubin
Wilfred W. Staples
Joseph S. Stein
Hyram L. Sutherland
Herbert S. Tally
Harold B. Title
Isidore V. Weisberg
Frederick J. Weitz
Seymour Wolf

Colorado State College

At the annual commencement exercises of Colorado State College, the following candidates, presented by Dean I. E. Newsom, received the degree of Doctor of Veterinary Medicine:

D. Warner Anderson
F. Whipple Andrews
Ernest D. Barrows
Ben Blood
Howard J. Bly
Walter E. Cameron
John R. Corcoran
Harold M. Deane
Bernhardt N. Frank
Morse A. Gates, Jr.
Eugene W. George
Harry A. Gorman
Douglas H. Gregory
James H. Hathaway
Arthur C. Herzberger
Virgil J. Humphreys
Charles E. Irvin, Jr.
George J. MacLean
John H. Pastor
Bruce Prendergast
Howard E. Sawyer
Willard Bruce Teller
Nathan A. Turner
Herbert E. Viergutz
Ralph C. Vierheller
H. Verne Wiser

The commencement address was given by Mr. W. A. Lloyd, Office of the Director, U. S. Department of Agriculture, Washington, D. C. Those elected to Phi Kappa Phi, the scholarship fraternity, from the veterinary division were: Harold Deane, Eugene George and H. Verne Wiser. H. Verne Wiser received the Phi Kappa Phi award for the highest scholarship in the entire institution.

Iowa State College

The annual commencement exercises of the Iowa State College were held June 12. The degree of Doctor of Veterinary Medicine was conferred on the following candidates, presented by Dean Charles Murray:

Dale S. Adams
Lucian P. Bailey
Alfred J. Bauman
Elmer Bild
Sidney S. Bjornson
Wayne A. Bohan
Warren E. Bowstead
Marcus E. Boyer
James H. Clements
William D. Daugherty
Clarence Dee
Oren Eastep
Ivan C. Fredrickson
Russell W. Gold
Lester J. Gorman
John Higbee
James M. Hood
Reuben R. Hovland
William E. Irwin
L. Meyer Jones
Ezra Kelsey
George A. Leonard
Willis A. Liebsch
Hugh M. Lightbody
Stanley A. Lovik
Andrew L. McGrath
Kenneth J. McKenzie
Ernest J. Mack
Elwin L. Mayfield
Howard Meyers
Theodore W. Millen
Matthew B. Munson
Allen J. Murphy
Clifford L. Nelson
Dean L. Niffenegger
Florian W. Nold
Donald Radloff
James D. Ramsey
Glenn W. Rieke
Rowland Rushmore
Alpheus H. Seeley
Henry P. Shoeman
*Margaret W. Sloss
Warren H. Smeltzer
Earl P. Smith
C. Laurel Telleen
Irvin H. Velflick
John B. Woodworth

Clarence Dee was the honorary student in veterinary medicine, winning the George Judisch Award. The winners of the G. G. Graham Awards, which are based on the students' work in clinical practice, are Andrew L. McGrath, first prize, and Willis A. Liebsch, second prize.

Kansas State College

At the 76th annual commencement of the Kansas State College on May 29, Dean R. R. Dykstra presented the following candidates for the degree of Doctor of Veterinary Medicine:

John E. Abbott
Marion C. Alson
Israel Berkowitz
Herbert P. Bolks
*Wade O. Brinker
Anthony M. Burdo
Franklin H. Burr
*N. H. Casselberry
Forrest W. Clark
Alton M. Coddington
Wayne D. Collins
Harry J. Conrad
Philip H. Curry
Eugene F. Damer
Albert A. Davies
Peter DeCinque
Clifford N. Decker
John P. Denton
William H. Dieterich
†Vincent Y. Druley
James A. Eskeldson
David E. Evans
Murray Feldman
Peter J. Germanio
Glenn G. Gross
Thomas J. Guilfoil
Clare C. Hamilton
Harris W. Hantman
Albert L. Havlik
Eldon F. Hayes
Merle L. Henrikson
Fung K. Huang
Aubrey M. Hutton
Donald C. Innes
Herman A. Jokerst
Raymond A. Jones
Frank W. Jordan
Wendell L. Kanawyer
Joseph B. Key
‡J. R. Knappenberger
Charles D. Labahn
Robert J. Lee
Howard B. Liebengood
Henry Loughridge

*With high honors.
†*In absentia.*

William J. McAllister
Albert L. Malle
Joseph R. Massey, II
Leonard J. Miller
Lynus R. Morton
Donald F. Mossman
Samuel S. Nebb
Walbert O. Nelson
‡Morris A. Nossov
Joseph S. Palen
Curtis A. Poppenhouse
G. C. Poppenhouse
‡Guy A. Railsback
Glen S. Remsberg
Donald E. Rodabaugh
Bernard Rovner
Darrell S. Steele
William F. Stoudenmire
George G. Tanenbaum
‡Edgar L. Taylor
Robert S. Todd
Phillip H. Vardiman
Roland E. F. Vollmar
Edward B. Zickefoose

Michigan State College

At the 81st annual commencement of the Michigan State College, the following students received the degree of Doctor of Veterinary Medicine:

Costas Alvanos
Manuel R. Artega
Ralph E. Beeba
Robert B. Castle
Edwin B. Cavell, Jr.
Leonard A. Clark
*John W. Cunkelman
Sylvester G. Graff
Herbert R. Hedler
Irving Israel
Bernard D. Kahl
William R. Kirvin
Melvin J. Klooster
*Raymond B. Larcom
Samuel J. Levine
Elmer L. Matthews
Gilbert C. Meyer
Seymour Notarius
Glen W. Reed
Carlton W. Remer
Jacob J. Schachter
Edward A. Schilf
Jack S. Shouba
Richard D. Siegle
Dale R. Stephenson
Anton R. Thompson
Russell R. Vickers
*Ralph C. Watson
Charles W. Weinberg
Burton H. Willet

The senior prize offered by the Michigan State Veterinary Medical Association was awarded to Elmer L. Matthews, and the veterinary faculty prize, given annually to the outstanding second-year veterinary student, was awarded to Donald R. Morrill.

Université de Montréal

Thirteen graduates from l'École de Médecine Vétérinaire de la Province de Québec, Université de Montréal, received the degree of Doctor of Veterinary Medicine at the commencement exercises, held on May 6. They are:

Simon Biron
Lucien Brault
Noel Brosseau
Daurent Choquette
Gabriel Couture
Urbain Dinel
Georgius Girard
Lucien Gonneville
Charles Grégoire
Maurice Mercure
Napoléon Mignault
Lucien Paquin
Jean Théoret

Lucien Brault was graduated with great honors, and Daurent Choquette, Urbain Dinel, Napoléon Mignault and Lucien Gonneville with honors.

‡With honors.
*Received degree at the close of the 1938 summer session.

Ohio State University

The 62nd annual commencement exercises of the Ohio State University were held on June 12. O. V. Brumley, dean of the College of Veterinary Medicine, presented the following candidates for the degree of Doctor of Veterinary Medicine:

William G. Andberg
Richard E. Baer
Ralph D. Barner
Francis G. Barrett
Joseph H. Berger
Paul E. Boyer
C. M. deVarennes
Russell B. Dickason
Milton R. Evans
Elkana M. Finney
Charles W. Fox
Sherman A. Glass
Paul L. Hanawalt
William K. Harris
James R. Hay
Oliver P. Heller
Benjamin S. Henson
John D. Hisgen
Edgar M. Houdeshell
Raymond R. Houser
Harold D. James
Irvin E. Kuhn
Thaddeus E. Lisowski
Harry M. Mauger, Jr.
Lyle P. Maxwell
David B. McBride
Samuel Melworth
Michael Michaelides
Karl H. Muntz
Edward P. Peck, II
Elizabeth N. Peck
Walter D. Primerano
Sigmund T. Reich
Ernest W. Rivers
Martin A. Ross
Maurice R. Shale
L. H. Shultzman
Gail B. Smith
Emmett W. Spieth
Earl M. Sprunger
James L. Stansbury
Willard M. Strawn
Robert C. Sweetser
Frederick J. Tacke
Ralph H. Wadsworth
George Walmsley
Paul M. Washburn
Robert D. Way

Ontario Veterinary College

The following candidates received the degree of Bachelor of Veterinary Science at the convocation of the University of Toronto, May 12, according to an announcement received from C. D. McGilvray:

N. E. Anderson
M. D. Bahensky
J. H. Ballantyne
G. L. Bannister
G. C. Bishop
N. M. Budgell
H. J. Bunde
L. A. Campbell
M. R. Campbell
W. A. Campbell
W. T. Carlyle
M. Y. Carpenter
F. G. Carter
G. Cueva
D. C. Davey
L. R. Davidson
R. W. Ford
D. M. Gamble
J. S. Gaw
W. R. Giesbrecht
J. P. W. Gilman
S. E. Gray
F. G. Heslop
R. E. Ingham
J. F. Julian
E. J. Kading
T. A. Kragness
E. W. Krueger
N. A. Labzoffsky
J. H. Leslie
A. E. Lewis
E. W. C. Manning
N. H. McAninch
D. H. McDole
J. M. McKague
E. J. Meyer
L. A. Meyer
L. Moore
S. J. Morrison
A. Morrow
R. C. Morrow
G. P. Mullen
W. P. O'Connor
E. F. Pallister
F. O. Read
J. M. Rumney
N. P. Schmidt
R. E. Schultz
N. D. Scollard
G. L. Shultz

R. I. Sinclair
H. V. Skelding
E. L. Symington
D. W. Thompson
W. J. Tower
G. W. Tyrrell
L. W. H. Vercoe
J. M. Warren
R. W. Woolner
J. H. Wrightman
G. A. Zinn

Prizes were awarded to members of the graduating class as follows:

Honor Standing

Gold medal for highest aggregate standing—E. L. Symington of San Antonio, Texas. Second, third, and fourth prizes were awarded to J. H. Leslie of Hamilton, Ont.; N. A. Labzoffsky of Toronto, Ont.; and Miss J. M. Rumney of Victoria Harbour, Ont., respectively.

Andrew Smith Memorial Medal

E. F. Pallister, Ottawa, Ont.

Helen Duncan McGilvray Prize

J. H. Leslie, Hamilton, Ont.

Bacteriology

N. A. Labzoffsky, Toronto, Ont.

Canadian Army Veterinary Corps Prize

J. H. Wrightman, Alvinston, Ont.

Milk Hygiene

E. L. Symington, San Antonio, Texas.

Cornell University

Dean W. A. Hagan of the New York State Veterinary College presented the following candidates for the degree of Doctor of Veterinary Medicine at the 71st annual commencement exercises of Cornell University, June 19:

John P. Ayres
F. Roy Badgley
Elizabeth G. Beckley
Wilson B. Bell
Clarence F. Bent
Frank McK. Birch
Vincent L. Boldt
Richard J. Bridgman
Arthur B. Christian
Clarence C. Combs, Jr.
Mark R. Crandall
George Dorney
Morris Erdheim
Gerald A. Faatz
Raymond Fagan
Walter G. Fallon
Rudolph Frohlich, Jr.
Robert Ferber
John L. Halloran, Jr.
John M. Holmes
Lyman L. Hoy
Norbert A. Lasher
Francis J. Kwong
James J. McCarthy
Sidney M. Martin
Albert Michaels
John D. Murray
Harold E. Nadler
Patricia O'Connor
Albert P. Pontick
Ralph Povar
A. Donald Rankin
Daniel P. Sasmore
Daniel Skelton
Milton Spiegel
Isidor I. Sprecher
Edwin J. Sunderville
Rikki von Decken-Luers
Donald A. Wood

University of Pennsylvania

At the 183rd annual commencement of the University of Pennsylvania, held on June 14, George A. Dick, dean of the School of Veterinary Medicine, presented the following candidates for the degree of Doctor of Veterinary Medicine:

Leonard J. Abell
Mary K. Amadon
Howard L. Baker, Jr.
Lemuel A. Branch
Wesley A. Clem, Jr.
Sidney Coane
Harold Y. Cooper
Patrick F. Cosgriff
W. Bartlett Coughlan
Ryland Croshaw
Phyllis Dingman
Arthur L. Edmunds, Jr.
Lynn B. Fake
Harlan W. Fenimore
Ralph C. Fish, Jr.
James H. Gillespie
William A. Haines, Jr.
James T. Herron
William F. Hoffman
Russell D. Holt
Welling C. Howell
Russell C. Jones, Jr.
Robert P. Juni
Victor Kemp
William R. Korns
Edwin M. Koshland
Leonard Krawitz
Jack A. Ladson
Thomas A. Ladson
Paul F. Landis
Benjamin Lepow
Julius H. Lewis
Stanford D. Merrill
Harold K. Miller
Walter H. Mitchell
Samuel H. Moser
William Murphey
Martin H. Ravitch
William N. Reed
J. Henry Ricker
Edward B. Rile
Harry J. Robertson
G. G. Rosenberger
Howard D. Sackett
Sander A. Sacks
Alvin F. Sellers
Joseph P. Seraichick
John W. Spranklin, Jr.
Karl F. Steinbach
Harold M. Summers
William H. Wright
Robert H. Yager

The J. B. Lippincott Prize of $100, for the highest general average in examinations during the four years, was awarded to Alvin Ferner Sellers.

The Jeanette Blair Prize of $50, for the best work done in the small animal clinic, was won by Leonard J. Abell.

The Leonard Pearson Prize, for the member of the senior class who, in the judgment of the faculty of the School of Veterinary Medicine, is best qualified, was awarded to Howard L. Baker, Jr.

The 1930 Class Prize, a book, is awarded to the member of the senior clas obtaining the highest average in the courses of surgery. Samuel H. Moser is the winner this year.

The Suburban Cattle Breeders' Association Prize of $25, offered to the member of the sophomore class who attains the highest average in the course in physiology, was won by Bertrand B. Dionne.

The Anatomy Prize of the Class of 1926, to the member of the sophomore class who does the best work in the courses of anatomy, was awarded to Glenn D. Gates.

Agricultural and Mechanical College of Texas

The 63rd annual commencement exercises of the Agricultural and Mechanical College of Texas were held on June 2. R. P. Marsteller, dean of the School of Veterinary Medicine, presented the following candidates for degrees:

Clinton D. Barrett	Charles T. Luker
Clarence K. Bennett	John N. McCamish
Marion E. Bowen	C. A. Maedgen, Jr.
Willard C. Brooks	Jerry Tom Martin
George P. Broussard	Harold Boswell Mills
Lee Roy Chapman	Fred Lester Molt
Paul Christian	Orin E. Mullins
Robert M. Clark	Ira Benzamin Nye
George C. Coburn	Charlie J. Paclik
Willard E. Corry	Herschel H. Payne
J. B. Couch	Harold E. Redmond
Clifferd Oray Enge	Harry B. Reele
Percy C. Enge	Walter White Sadler
B. F. Gearhart	Carl Henry Scholle
William J. Gililland	Edmund E. Sebesta
Vincent E. Greening	Seidel M. Stephens
Glen G. Hampton, Jr.	Edward W. Swarthout
Glen Floyd Hover	Edwin W. Thomas
John William Howder	Victor Tierstein
Oliver Lee Jenkins	Drue S. Ward
Elbert Lloyd Kelley	Floyd Bentley Watts
Harry Klauber	Lonnie H. Weaver
Robert Dodd Lozo	Ralph Silas Weston

State College of Washington

The 43rd annual commencement exercises of the State College of Washington were held June 5. E. E. Wegner, dean of the College of Veterinary Medicine, presented the following candidates for the degree of Doctor of Veterinary Medicine:

*Robert John Au	‡Philip A. Lee, Jr.
*Harold Beadner	Ray W. McFarland
John W. Beauchamp	Robert J. McFarland
E. W. Bloomquist	Mervyn D. McKenzie
Clark E. Burt	Clayton H. Mickelsen
†Birdsall N. Carle	*Charles S. Miller
Robert L. Clinton	*Elmer D. Moxley
Fernley W. Duey	†Leslie C. Murphy
W. M. Dungan, Jr.	Carl A. Schneider
*Jean A. Flanigan	Carl M. Sepponen
Albert Goodman	Roland E. Sivyer
Earl M. Harris	Sydney M. Smith
Ronald T. Hauge	William E. Steinmetz
Roy I. Hostetler	*Willard D. Ward
Loris O. Johnson	Herrick A. Wheeler

*Completed work for degree during the summer of 1938 or in February of 1939.

†With highest honors.

‡With high honors.

U. S. GOVERNMENT

Regular Army

Boards have been appointed to meet at the following places for the purpose of examining applicants for commission in the veterinary corps, regular army: Fort Jay, N. Y.; Washington, D. C.; Fort Benning, Ga.; Fort Sheridan, Ill.; Fort Riley, Kan.; Fort Sam Houston, Texas; Fort Sill, Okla.; Fort Bliss, Texas; Fort Francis E. Warren, Wyo.; Seattle, Wash.; and San Francisco, Calif.

Lt. Colonel Burlin C. Bridges is assigned to duty at Fort Bliss, Texas, effective upon his return from foreign service in the Hawaiian department.

The promotion of the following-named officers to the grade of captain with rank from date opposite their names is announced.

1st Lt. Stephen C. Asbill, May 14, 1939.

1st Lt. Benj. F. Leach, May 17, 1939.

Lt. Colonel Kenneth E. Buffin is relieved from duty at Carlisle Barracks, Pa., effective in time to proceed to New York,, N. Y., and sail on transport scheduled to leave that port on or about August 15, 1939, for duty in the Hawaiian department.

Captain Curtis W. Betzold's tour of foreign service in the Philippine department has been extended one year.

The following named officers of the veterinary corps are relieved from duty at the stations indicated, and directed to proceed to Washington, D. C., and report to the commanding general, Army Medical Center, for the purpose of pursuing the course of instruction at the Army Veterinary School beginning September 15, 1939.

Capt. Stephen G. Asbill, Presidio of Monterey, Calif.

Capt. Walter Smith, Fort Riley, Kan.

1st Lt. Don L. Deane, Fort Bliss, Texas.

Captain Benj. F. Leach is directed to proceed at the proper time from Carlisle Barracks, Pa., to Washington, D. C., and report to the commanding general, Army Medical Center, for temporary duty for a period of approximately four months, for the purpose of pursuing a course of instruction at the Army Veterinary School beginning September 15, 1939, upon completion to return to his proper station, Carlisle Barracks.

Corporal Robert W. Pitman, medical department (veterinary service), Carlisle Barracks, Pa., has been sent to Fort Jay, N. Y., for temporary duty, and assigned to the World's Fair detachment at Camp Geo. Washington, N. Y. Upon completion of this temporary duty he will return to his proper station.

Veterinary Corps Reserve

NEW ACCEPTANCES—FIRST LIEUTENANTS

Robert Henry Gump, 801 N. Mississippi, Ada, Okla.

John Henry Thaxton, Llano, Texas.

PROMOTIONS—TO CAPTAIN

Hugh F. J. Arundal, 358 Savannah Ave., Statesboro, Ga.

Sidney Jerome Michael, 433 W. 9th St., Erie, Pa.

John South Whitefield, State College, Miss.

U. S. Department of Agriculture
Bureau of Agricultural Economics

ADVERSE CLIMATIC CONDITIONS HOLD SHEEP CROP UNDER 1938 LEVEL

Supplies of new-crop lambs for slaughter probably will be smaller than a year earlier, through June at least, according to the bureau of agricultural economics. Marketings of grass-fed yearlings and other sheep also are expected to be less than in the late spring and early summer of last year.

Unfavorable weather and feed conditions in Texas, California, and the northwestern states during April retarded the development of early lambs in these states. In the early lambing areas of the native sheep states, weather and feed conditions were on the whole favorable. Pastures improved rapidly in the latter part of the month, but the condition of early lambs on May 1 was somewhat below average. The delay in marketings of early lambs probably will mean that fairly large numbers of such lambs will be marketed after June or July, when late lambs are usually being marketed in large volume.

Prospects generally are favorable for the late lamp crop in the western states, and it may be that most of the reduction in the total crop will be in early lambs (those normally marketed by the end of July). However, with conditions in several important sheep areas not as favorable as last year, it is unlikely that the total 1939 lamb crop will approach the record 1938 crop level.

SMALLER CATTLE SLAUGHTER EXPECTED THIS YEAR, UNLESS DROUTH RECURS

Because of the tendency throughout the country to hold a large proportion of breeding stock on farms in order to increase herds, numbers of cattle for slaughter are expected to continue smaller than last year. This opinion is expressed in the bureau's recently published estimate of the beef-cattle situation. Except in parts of California and Texas, and in certain limited areas of other western states, where lack of rainfall has definitely reduced prospects for ranges and pastures, pasture condition throughout the country is fairly good.

SPRING PIG CROP EXPECTED TO BE ABOVE 1938 DESPITE LOSSES

"Spring production of pigs will probably be considerably larger than in 1938," the bureau of agricultural economics announces in its latest report on the hog situation. Relatively large losses of spring pigs have been reported in some areas. The average number of pigs saved per litter may be smaller than the record high average of last spring, but reports in general indicate that there is a substantial gain in the number of sows farrowing over last year.

Cash farm income from hogs in 1938, totalling 874 million dollars, was about 5 per cent smaller than in 1937. Except for 1936 and 1937, however, the income from hogs last year was the largest since 1930. The total volume of hogs and hog products sold off farms in 1938 was larger than in 1937, so that the reduction in income was brought about by lower prices. This decline in prices from 1937 to 1938 resulted from larger marketings as well as the weaker consumer demand for hog products, according to bureau economists.

U. S. Department of Agriculture
Bureau of Biological Survey

GRAY SQUIRREL INVESTIGATION IN SOUTHEASTERN OHIO

Interesting facts about the life history and ecology of the southern gray squirrel have been discovered by Floyd B. Chapman, in a survey sponsored by the Ohio division of conservation and the Ohio wildlife research unit. During 1935, 1936, and 1937, the years in which the study was made, hunting in three large tracts of forest land in southeastern Ohio was rigidly controlled. Hunters were required to check in and out of the specially established stations so that statistical data on the game observed and harvested might be obtained.

Weights of the squirrels taken by hunters ranged from 4 to 24 ounces. About 90 per cent of the squirrels are born in tree nests, the rest in leaf nests. The important mating season comes in January and February and the number of young per litter averages four. These squirrels seem to be unusually subject to infestation by the larvae of a botfly, positive cases averaging 12 per cent of the total number examined during the three years. A few squirrels carried other external parasites, fleas and mange mites. No ticks were found. Parasitological examinations revealed that coccidia, roundworms, and tapeworms also were present in large numbers.

United States Department of Agriculture

METHOD OF PROVING SIRES DEVISED FOR BEEF BREEDS

Beef cattle specialists of the United States Department of Agriculture have developed a simple method of "proving" beef sires similar to the plan now used in "proving" dairy sires. By this method young bulls may be proved by their first calves and their value as sires determined.

The two plans are alike in that the worth of the sire in both cases depends on his progeny's record of performance. The beef sire is judged on his ability to transmit a capacity for efficient gains and high-quality meats just as the dairy sire is rated on his ability to transmit the capacity for high milk and butterfat production. Proving of beef sires has required study and evaluation of many factors affecting the calf from the time of birth until it is slaughtered, say W. H. Black and Bradford Knapp, animal husbandmen who conducted the studies. They have studied sire performance for eight years with four beef breeds at three experiment stations.

The first essential in proving the beef sire is an equal opportunity for all of his calves on test—there should be a minimum of five test calves. Because the dam of one calf may give more milk than another, the test is begun shortly after weaning time and the calves weaned at the same weight regardless of age. In the Department's tests all calves were started on the test at 500 pounds and slaughtered at 900 pounds. Each calf was allowed to eat all it wanted, so as to make full use of its ability to produce efficient gains and high quality meat, and an accurate check on the amount of food each consumed was kept. Only calves from purebred dams of the same breed as the bull were used in the tests.

In developing the method 20 body measurements were made of each calf as it went on feed and again just before slaughter, but it was found that weight and height of the animal at the withers give a good correlation of all the measurements. From these two measurements, the grade of the steer may be determined. Using this method of evaluation, it is pointed out, a record of the worth of all beef sires would be available, if kept by a central agency.

That the record-of-performance tests may eliminate some sires with blue ribbon ancestry was shown at one of the stations. Here, calves from two bulls of prize-winning ancestry were placed on a corn and alfalfa ration—the corn valued at 60 cents a bushel and the alfalfa hay at $20 a ton. The cost of the 400-pound gain for calves of one sire was $31.66 less per calf than for the other sire.

GROSS FARM INCOME DECLINES 18% IN 1938; GOVERNMENT PAYMENTS UP 31%

Farmers realized a gross farm income of $9,220,000,000 in 1938 compared with $10,350,000 in 1937, according to a revised series of farm-income estimates of the bureau of agricultural economics. The total in 1936 was $9,672,000,000; low for the 1925-38 period was $5,562,000,000 in 1932.

The gross income estimates include cash income from sales of farm products, the value of farm products retained for consumption in the farm home at average prices received by producers, and government payments to farmers. Cash farm income, as revised, declined from $8,621,000,000 in 1937 to $7,538,000,000 in 1938, while the value of products retained for home consumption declined from $1,362,000,000 to $1,200,000,000. Government payments under the agricultural conservation program increased from $367,000,000 in 1937 to $482,000,000 in 1938.

The greater portion of the decline in gross farm income from 1937 to 1938 was due to the decrease in income from crops, particularly the grains, fruits, vegetables and cotton. Gross income from all crops in 1938 was 18 per cent less than a year earlier, whereas income from live stock and live stock products declined less than 9 per cent. Income from government payments was 31 per cent larger in 1938, which partially offset the decline in gross income from farm products.

According to the revised estimates, gross income from meat animals declined from $2,594,000,000 in 1937 to $2,401,000,000 in 1938, a decline of 7.5 per cent. Income from cattle and calves was only about 6 per cent lower than in 1937, whereas income from hogs declined 8 per cent and income from sheep and lambs, exclusive of wool, was down 16 per cent.

Sales of horses and mules, particularly mules, were smaller than in 1937; prices also were lower, and income from horses and mules declined 14 per cent. Larger sales of chickens and eggs were more than offset by declining prices, and the gross income of $966,000,000 from these products was 6 per cent less than in 1937. Production of dairy products was also heavier in 1938 than in 1937, but prices increased less than seasonally during the last half of the year and were somewhat lower than a year earlier. Income from dairy products was more than 9 per cent less than in 1937.

Department of Commerce

Bureau of Foreign and Domestic Commerce

MEDICINAL EXPORTS INCREASING STEADILY

Exports from the United States of medicinal, pharmaceutical, biological, and related

products have increased steadily during the current year and are rapidly approaching the all-time peak of 1929, according to the chemical division of the Department of Commerce.

Exports of such products in April of this year were valued at $1,809,000, bringing the total for the first four months of 1939 to $6,350,000 compared with $5,475,000 for the corresponding period of 1938, statistics show.

The chemical division has recently completed a survey, the first in ten years, outlining market conditions for medicinal products in the various foreign countries, giving the highlights of competition, the extent and character of the demand, and other pertinent factors involved in marketing such products in the different countries of the world.

B. A. I. Transfers

EDWARD P. ANDERSON (K. C. V. C. '17), from Lincoln, Neb., to Bismarck, N. Dak., on Bang's disease.

EARL G. BAILEY (K. C. V. C. '18), from Jefferson City, Mo., to Atlanta, Ga., on Bang's disease.

HENRY D. BRADSHAW (A. P. I. '27), from Memphis, Tenn., to Jackson, Miss., on hog cholera.

BENJAMIN Z. BURLESON (A. P. I. '21), from Saint Louis, Mo., to Atlanta, Ga., on Bang's disease.

FORREST O. COX (K. S. C. '34), from Richmond, Va., to Chicago, Ill., on meat inspection.

JAMES E. ELLIS (K. C. V. C. '03), from Boise, Idaho, to Salt Lake City, Utah, on meat inspection.

HOWARD C. GALE (K. C. V. C. '10), from Atlanta, Ga., to Jacksonville, Fla., on Bang's disease.

ALBERT N. GLASSMAN (O. S. U. '37), from Charleston, W. Va., to Chicago, Ill., on meat inspection.

JAMES R. HOUCHINS (U. S. C. V. S. '17), from Jacksonville, Fla., to Atlanta, Ga., on Bang's disease.

MARTIN H. JOHNSON (Iowa '33), from Pierre, S. Dak., to Bismarck, N. Dak., on Bang's disease.

WALFORD J. JOHNSON (Wash. '26), from Lincoln, Neb., to Bismarck, N. Dak., on Bang's disease.

ED. P. KLEEMAN (O. S. U. '28), from Jefferson City, Mo., to Chicago, Ill., on meat inspection.

ROBERT P. LUSCO (A. P. I. '33) from Atlanta, Ga., to Saint Louis, Mo., on meat inspection.

ADDISON BLAIR (K. S. C. '34), from Jackson, Miss., to Chicago, Ill., on meat inspection.

SILAS J. GOLDSTEIN (McK. '14), from Peoria, Ill., to S. Saint Paul, Minn., on meat inspection.

ROBERT B. GRIMES (K. C. V. C. '05), from Kansas City, Kan., to Jefferson City, Mo., on hog cholera.

DOYLE W. HENNESSEE (Tex. '38), from Baton Rouge, La., to Jacksonville, Fla., on Bang's disease.

CLAUDE C. HUDSON (K. S. C., '33), from South Saint Paul, Minn., to Chicago, Ill., on tuberculosis eradication.

JOHN R. NETTLES, JR. (A. P. L. '35), from Richmond, Va., to San Juan, Puerto Rico, on tick eradication.

JOHN A. PHILLIPS (T. H. '12), from Fort Worth, Texas, to Little Rock, Ark., on Bang's disease.

HARRY E. SKOOG (K. S. A. C. '30), from Richmond, Va., to Chicago, Ill., on meat inspection.

HOMER A. WILSON (K. C. V. C. '13), from Saint Louis, Mo., to Frankfort, Ky., on hog cholera.

JOHN R. WIRTHLIN (Cin. '17), from Jacksonville, Fla., to Richmond, Va., on tick eradication.

LINDEN M. ALCORN (K. S. C. '33), from Oklahoma City, Okla., to Little Rock, Ark., on Bang's disease.

HUBERT L. ALLEN (A. P. I. '37), from Baton Rouge, La., to Atlanta, Ga., on Bang's disease.

DONALD R. APPEL (Cin. '20), from Oklahoma City, Okla., to Saint Louis, Mo., on meat inspection.

VINCENT C. BEVENUE (K. S. C. '38), from West Fargo, N. Dak., to Milwaukee, Wis., on meat inspection.

CHARLES S. CASSIAS (Colo. '38), from Oklahoma City, Okla., to Baltimore, Md., on Bang's disease.

AUGUSTUS B. CLARK (A. P. I. '34), from Oklahoma City, Okla., to Richmond, Va., on Bang's disease.

HERBERT C. CRAM (Cin. '13), from Richmond, Va., to Jacksonville, Fla., on Bang's disease.

CLIFFORD E. DUNN (Ind. '15), from Frankfort, Ky., to Louisville, Ky., on meat inspection.

CARL FINK (Tex. '38), from Oklahoma City, Okla., to Baltimore, Md., on Bang's disease.

JOHN GALE (O. S. U. '34), from New York City to Montpelier, Vt., on Bang's disease.

MARK E. GALE (K. S. C. '36), from Oklahoma City, Okla., to Jacksonville, Fla., on Bang's disease.

PAUL A. SOLDNER (O. S. U. '38), from Baltimore, Md., to Jackson, Miss., on Bang's disease.

SIMON J. GOODMAN (U. P. '35), from Richmond, Va., to Newark, N. J., on meat inspection.

FREDERICK G. HARTWIG (K. S. A. C. '16), from Sacramento, Calif., to Boise, Idaho, on Bang's disease.

JOHN M. HURD (K. S. C. '34) from Oklahoma City, Okla., to Baltimore, Md., on Bang's disease.

HARRY E. KINGMAN, JR. (Colo. '33), from Sacramento, Calif., to Chicago, Ill., on meat inspection.

LEE ROY MIMS (A. P. I. '32), from Jackson, Miss., to San Juan, Puerto Rico, on tick eradication.

AMONG THE STATES

Arizona

A convention of the Arizona Public Health Association, of which veterinarians of the State of Arizona are considered a part, was held at the Adams Hotel, Phoenix, May 4-5. In the early part of 1939 the Association voted to admit veterinarians and appointed C. T. Guilfoyle of Phoenix as program chairman of the veterinary section for the year.

Following the veterinary session at the meeting, a motion was made and carried to reorganize the Arizona Veterinarian's Association, which has been inactive for the past four years. It was unanimously agreed to hold meetings semiannually, as was the practice in former years.

Officers were elected as follows: F. D. McMahon of Phoenix, president; G. G. Crosbie of Tucson, vice-president; and Ward R. Lee of Phoenix, secretary-treasurer. T. B. Jones, state veterinarian, was appointed to succeed Dr. Guilfoyle as program chairman of the veterinary section of the Arizona Public Health Association for the years 1939-40.

California

The Sixth Pacific Science Congress will convene in San Francisco, July 24 to August 12. Stanford University and the University of California will be the host institutions for the Congress. The Golden Gate International Exposition will assist and coöperate with them in the enterprise. The sessions of the first period, July 24 to August 5, of the meeting will be held mainly at the University of California, which will provide meeting places on its campus in Berkeley. The sessions of the second period, August 6-12, will meet at Stanford University.

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E. A. Rodier, former acting business manager of the A.V.M.A., has opened a fine small animal hospital at 3561 Foothill Blvd., Oakland, Calif.

Dominion of Canada

Professor Thomas W. M. Cameron, director of the Institute of Research, MacDonald College, Quebec, and coeditor of the *Canadian Journal of Comparative Medicine*, was made a Fellow of the Royal Society of Canada in recognition of his excellent researches on parasitology.

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Dr. Francois Théodule Daubigny, longtime director of the École Vétérinaire (Laval and Montreal) and a prominent figure in the development of the veterinary profession in eastern Canada, passed away on April 1, 1939, after a long illness. He is recalled as a man of great mental and physical strength—a giant on both counts, a leader in education, and an outstanding clinician.

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The Andrew Smith Memorial Medal, annual prize of the Ontario Veterinary College Alumni Association, was awarded to E. F. Pallister this year.

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The leading editorial of the *Canadian Journal of Comparative Medicine* for May, 1939, is a write-up about A. E. Cameron, newly appointed veterinary director general of the Dominion. It relates briefly the world-wide travels and experiences of this modest but exceedingly versatile member of the Executive Board of the A.V.M.A.: merchant, trader, sailor, mounted policeman, veterinary officer, research worker, pathologist, connoisseur of contagious diseases, director of meat inspection, and practitioner.

Delaware

The University of Delaware, Newark, has received from Mr. H. G. Haskell, owner of the famous Hill Girt Guernsey herd, funds for conducting fundamental research in animal diseases. Charles M. A. Stine, vice-president and director of research of the Du Pont Company, is the general adviser. The staff consists of James R. Hay, B.A., D.V.M., Ohio State University; James C. Kakavas, Ph.D., Yale University; Miss Hanna Maier, Goettingen School for Technical Assistants, Germany; Miss Rosanne Feeney, B.A., University of Delaware; and Charles C. Palmer, D.V.M., Ohio State University, M.S., University of Minnesota.

Georgia

The Georgia legislature has appropriated funds to continue Bang's disease work.

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The Georgia State Veterinary Medical Association met at the Everee Club in Griffin on June 13-14. The program consisted of a literary session, surgical clinic, barbecue and dance. Out-of-state speakers were Wm. E. Cotton, I. S. McAdory, and R. L. Mundhenk, all of Alabama Polytechnic Institute, Auburn, Ala.; and L. A. Merillat, Chicago, Ill.

Hawaii

William Parker (Wash. '38) recently accepted a position with the sugar plantations on the east side of Kauai and was appointed at the same time a deputy territorial veterinarian.

These respective appointments were vacated by Cyril Golding (San Fran. '11) in August of 1938 following his return to the Coast after 21 years.

Illinois

The Chicago Veterinary Medical Association held its annual ladies' party at the College Inn of the Hotel Sherman in Chicago, June 24. Dinner was served at 7:00 p. m. and, afterwards, spacious rooms were provided for card playing and entertainment. There were favors for all of the ladies and prizes for the card players.

Indiana

The Second Nutrition Conference for Veterinarians, sponsored by the Central Soya Company, Inc., is to be held in Decatur on Wednesday, July 12. An excellent program featuring nationally known authorities is being arranged. Last year, over 200 veterinarians from Indiana, Ohio and Michigan attended the conference, the first of its kind ever held in this country.

Iowa

The Eastern Iowa clinic held at Waterloo, June 20, was an unusual exhibition of clinical veterinary medicine. Started in a modest way nine years ago, these annual events have become the pattern for other associations throughout the Middlewest. The Waterloo clinic will be remembered as the one held in the palatial Hippodrome of the National Dairy Congress, where nothing was lacking in space, accoutrement, order and convenience. An attendance of 320 established a new record for summer clinics. The number and variety of clinical cases presented for diagnosis and treatment, and the interesting display of pathological specimens by the U. S. bureau of animal industry, rounded out a day that will long be remembered.

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A new publication outlet for manuscripts dealing with science and technology has been provided at Iowa State College, Ames, by the recent organization of the Iowa State College Press. The major purpose of the new press, as outlined in its statement of editorial policy, is "to serve learning, and particularly learning in fields of science and technology, by providing a channel of publication."

The new press will consider for publication manuscripts not only from Iowa State College but from other sources as well. It will be especially interested in developing publications in certain subject-matter fields in science and technology for which satisfactory channels of publication are not elsewhere available.

The manufacture and sale of Iowa State College Press books will be conducted by the Collegiate Press, Incorporated, Iowa State College, Ames.

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In a silvered binding, a 156-page souvenir book commemorating the silver anniversary of the Eastern Iowa Veterinary Association made its appearance on June 12. Assembled and published by nine practitioners, the book reviews the progress of veterinary medicine during the past 25 years. Many notable figures in the veterinary profession contributed to its content.

Massachusetts

Middlesex University in Waltham announces the appointment of Leo Weisz as a full-time professor in the department of pathology and parasitology, school of veterinary medicine.

Dr. Weisz arrived the second week in June from Brno, Czecho-Slovakia, where for the past 25 years he served as chief of an animal hospital. In 1913, he received the degree of Doctor of Veterinary Medicine from the University of Vienna, where he served as a faculty member for several years. He also holds a diploma as an expert in milk and food hygiene and was a sworn court expert in veterinary medicine in Czecho-Slovakia. During the World War, Dr. Weisz held a commission of lieutenant-veterinarian and served for four years as head of a surgical hospital for horses on the Italian front. More recently, he held the same position in the Czech army.

He was appointed professor of veterinary medicine at Masaryk University in 1937 but was forced to relinquish that position when the University was closed after the German occupation of the country.

Dr. Weisz is the author of a number of scientific texts in the field of veterinary medicine and on the prevention of cruelty to animals.

Michigan

The new veterinary building at Michigan State College, East Lansing, housed the combined 57th annual meeting of the Michigan State Veterinary Medical Association and the 16th annual Post-Graduate Short Course for Veterinarians, held on June 26-28. The dedication of the new building was held on Monday afternoon, June 26.

Minnesota

This year again, as in the past 16 years, the University of Minnesota and the Minnesota State Veterinary Medical Society coöperated in conducting a short course for veterinarians, to make available the newer facts and methods in veterinary medicine.

Missouri

The spring season of 1939 was a favorable one for Missouri. Rains were more plentiful

and the crops were good. If stabilization of farm prices can be further achieved and if the general level of employment is increased, the coming year should be exceptionally prosperous.

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Through the efforts of the Kansas City Veterinary Medical Association, a modification of the city ordinance providing for free vaccination of dogs for rabies has been obtained. They have succeeded in bringing this line of service into the hands of the private practitioner.

Montana

The Montana legislature adjourned in April after failing to appropriate funds to carry out Bang's disease work.

Ohio

The "big news" that has all the veterinarians of Ohio talking this month is the coming Seventh World's Poultry Congress, to be held in Cleveland, July 28 to August 7. This and the very successful Ohio State College Twelfth Annual Veterinary Conference, held at the College on June 14-16, have attracted the attention of veterinarians all over the country.

New Jersey

On Thursday, April 27, a second meeting of the proposed local association for veterinarians of Trenton and vicinity was held. The committee of three in charge of the meeting consisted of Samuel Coane, who spoke briefly on the purposes of the association; H. H. Bair, who discussed the marketing of uninspected meats and the sale of moribund animals; and J. B. Hagenbuch, who discussed the use of insulin in the treatment of acetonemia.

The name "Trent Veterinary Medical Society" was adopted.

Pennsylvania

Mack A. Emmerson, assistant professor of veterinary surgery at the University of Pennsylvania, has been studying for the past six weeks the recent developments in the German schools in the handling of x-ray therapy. His reports indicate that his visits to Vienna and Munich have been most satisfying but that because of political conditions, he is unable to visit the University of Prague, where considerable work has been done along these lines.

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The position of vice-president in charge of medical affairs, University of Pennsylvania, recently vacated by the sudden death of Alfred Stengel, has been filled by A. N. Richards, professor of phramacology in the medical school of the University. Dr. Richards will be remembered best for his outstanding contributions to the knowledge of kidney physiology, for which he is internationally acknowledged. In his new capacity, Dr. Richards will have as part of his duties the direction of veterinary activities.

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The ninth annual convention of the Biological Photographic Association will be held at the Mellon Institute for Industrial Research, Pittsburgh, September 14-16.

The program will be of interest to scientific photographers, scientists who use photography as an aid in their work, teachers in biological fields and technical experts. It will include discussions of motion pictures and still photography, photomicrography, color and monochrome films, processing, etc.—all in the field of scientific illustrating. Up-to-date equipment will be displayed in the technical exhibit and the work of many of the leading biological photographers of this country and Europe will be displayed.

Further information about the Association and the convention may be obtained through correspondence with the Secretary of the Biological Photographic Association, University Office, Magee Hospital, Pittsburgh, Pa.

South Carolina

One of the most interesting meetings of the South Carolina Association of Veterinarians was held on June 6 at the Jefferson Hotel, Columbia. This was a call meeting for special business on legislation which had been introduced in the state senate allowing serum and virus to be administered by laymen. This bill was passed before South Carolina veterinarians had learned about it and was placed before the House for special order on June 8.

Most of the veterinarians in the state attended the meeting and the plans for defeating the bill were engineered. When it was brought up for action in the House on June 8, the veterinarians had so completely convinced the legislators of the faults of the bill that only two representatives voted in favor of it.

Tennessee

Each month the division of animal disease control of the Department of Agriculture, State of Tennessee, issues a report on outbreaks of various diseases in the state. According to their statistics, during the month of May there were 93 outbreaks of hog cholera in 23 counties of the state, Wayne county, with 27 outbreaks, being most seriously affected.

There were 30 outbreaks of erysipelas in 15 counties; six of hemorrhagic septicemia, one in each of six counties; 13 outbreaks of rabies in one county, Rutherford; and one outbreak of blackleg in Bradley county.

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The Committee on Local Arrangements for the Memphis meeting of the A.V.M.A., basing

themselves on United States weather bureau findings, reports that the temperature in Memphis during the latter part of August and the early part of September is 5 to 6° cooler than that of other parts of the country.

Texas

Elbert Lloyd Kelley of Utopia aspired to be the veterinarian for the Valdina Farms, in Uvalde county, near Utopia, owned by B. F. Woodward of Houston. The young man entered the school of veterinary medicine of the Agricultural and Mechanical College of Texas and, under the direction of E. P. Marsteller, dean, received the degree of Doctor of Veterinary Medicine, in June.

Upon graduation, he returned to Uvalde county to assume the position of veterinarian of Valdina Farms, thereby realizing his ambition. His scholastic record was exceptionally good, and he participated in many of the school's activities.

Wisconsin

Herbert Lothe (O.S.U. '13) of Waukesha, Wis., was appointed by President Bergman to the Executive Board of the A.V.M.A. on June 19. He will fill the vacancy left by L. A. Merillat, who resigned as member of the Board for District 3 when he assumed the position of executive secretary of the Association. Dr. Lothe will serve until 1943.

COMING MEETINGS

Ontario Veterinary College Short Course for Veterinarians and Ontario Veterinary Association. Ontario Veterinary College, Guelph, Ont. July 4-6, 1939. W. J. Rumney, Secretary, 612 King St. W., Hamilton, Ont.

Small Animal Hospital Association. Los Angeles, Calif. July 5, 1939. R. W. Gerry, Secretary, 8474 Melrose Ave., Los Angeles, Calif.

Dallas-Fort Worth Veterinary Medical Society. Adolphus Hotel, Dallas, Texas. July 6, 1939. H. V. Cardona, Secretary, 2736 Purington Ave., Fort Worth, Texas.

Ak-Sar-Ben Veterinary Medical Association. Fontenelle Hotel, Omaha, Neb. July 10, 1939. J. D. Ray, Secretary, 1124 Harney St., Omaha, Neb.

Northwest Veterinary Medical Association. New Washington Hotel, Seattle, Wash. July 10-12, 1939. V. C. Pauhlman, Secretary, 1524 Fifth St., Chehalis, Wash.

Maine Veterinary Medical Association. Rangley Lake, Rumford, Me. July 12, 1939. A. E. Coombs, Secretary, 1 Kennebec St., Skowhegan, Me.

Saint Louis District Veterinary Medical Association. Melbourne Hotel, Saint Louis, Mo. July 12, 1939. J. P. Torrey, Secretary, 610 Veronica Ave., East Saint Louis, Ill.

Virginia State Veterinary Medical Association. Hotel Monticello, Norfolk, Va. July 12-14, 1939. A. J. Sipos, Secretary, 1102 State Office Bldg., Richmond, Va.

Veterinary Medical Association of New Jersey. Hotel Berkeley-Corteret, Asbury Park, N. J. July 13-14, 1939. J. G. Hardenbergh, Secretary, c/o Walker-Gordon Laboratory Co., Plainsboro, N. J.

New York State Veterinary Medical Society. Hotel Utica, Utica, N. Y. July 13-15, 1939. F. F. Fehr, Secretary, 243 S. Elmwood Ave., Buffalo, N. Y.

Kansas City Veterinary Medical Association. Kansas City, Mo. July 17, 1939. S. J. Schilling, Secretary, Box 167, Kansas City, Mo.

San Diego County Veterinary Medical Association. Zoölogical Research Bldg., Balboa Park, San Diego, Calif. July 17, 1939. Glenn A. Tucker, Secretary, Vista, Calif.

Southern California Veterinary Medical Association. Chamber of Commerce Bldg., Los Angeles, Calif. July 19, 1939. Charles Eastman, Secretary, 725 S. Vancouver Ave., Los Angeles, Calif.

World's Poultry Congress, Seventh Annual, Cleveland, Ohio. July 28-August 7, 1939. W. R. Hinshaw, Chairman, Section on Pathology and Disease Control, University Farm, Davis, Calif.

Western New York Veterinary Medical Association. McPherson Point, Conesus Lake, N. Y. July 29, 1939. F. F. Fehr, Secretary, 243 S. Elmwood Ave., Buffalo, N. Y.

Connecticut Veterinary Medical Association. Pease House, Saybrook Point, Conn. August 2, 1939. Geo. E. Corwin, Secretary, State Office Bldg., Hartford, Conn.

Vermont Veterinary Medical Association, Hotel Berwick, Rutland, Vt. August 4-5, 1939. G. N. Welch, Secretary, 43 Union St., Northfield, Vt.

American Veterinary Medical Association, Peabody Hotel, Memphis, Tenn. August 28-September 1, 1939. L. A. Merillat, Executive Secretary, 221 N. LaSalle St., Chicago, Ill.

State Board Examinations

Connecticut State Board of Veterinary Registration and Examination. The next examination will be held in the office of the secretary, room 285, State Office Building, Hartford, July 5, 1939. Further information may be obtained from Geo. E. Corwin, Secretary and Treasurer, State Office Building, Hartford, Conn.

Indiana State Veterinary Examining Board. The next examination will be held in Rooms 209-210, State House, Indianapolis, Ind., July 11, 1939. For further information, communicate with J. L. Axby, Secretary, Room 209, State House, Indianapolis, Ind.

Virginia State Board of Veterinary Examiners. The next examination will be held at the Monticello Hotel, Norfolk, Va., beginning promptly at 9:00 a. m., July 12, 1939. For application blank and further information, communicate with H. H. Adair, Secretary, Bristol, Va.

Illinois State Board of Veterinary Examiners. Examinations will be held in Chicago, July 24-25, 1939. Applications must be filed on blanks furnished by the Department of Registration and Education, Springfield, not later than 20 days before that date. The Board consists of W. W. Warnock, Aledo; W. H. Shaw, Pawnee, and L. A. Merillat, Chicago, Chairman. The fee is $20.00.

MEETING REPORTS

Virginia Conference of Graduate Veterinarians

The sixth annual conference of graduate veterinarians was held at the Virginia Polytechnic Institute, Blacksburg, Va., March 7-9, 1939. With 68 in attendance, the following program was presented during the three-day session.

"The Diagnosis of Some Newer Canine Diseases," Norman J. Pyle, Pearl River, N. Y.

"Some Pitfalls in Poultry Practice" (lecture and demonstrations), E. P. Johnson, Virginia Polytechnic Institute, Blacksburg, Va.

Demonstration of Laboratory Procedure in Practice, D. F. Watson, Pulaski, Va.

"Artificial Insemination of Cattle" (lecture and demonstration), J. A. Henderson, Flemington, N. J.

"Breeding Problems of Dairy Cattle with Special Reference to Trichomoniasis and Granular Vaginitis," W. A. Hornaday, Greensboro, N. C.

The following men led a panel discussion on the relationship of practitioners to state and federal agencies:

Dean H. L. Price of Virginia Polytechnic Institute. H. C. Givens, state veterinarian.

John R. Hutchison, extension director, Virginia Polytechnic Institute.

S. B. Fenne, extension entomologist on bot control.

I. D. Wilson, head of the department of biology and animal zoölogy, Virginia Polytechnic Institute.

It was extremely regretted that Ashe Lockhart of Kansas City, Mo., and William S. Miller of Haddon Heights, N. J., were unable to attend, owing to illness in their families.

A combination dinner and social hour was held on Wednesday evening, March 8, in the faculty center. I. D. Wilson, acting as toastmaster, introduced the following after-dinner speakers: H. L. Price, H. C. Givens, W. L. Thelkeld, J. E. Greer, G. C. Faville, and others. In introducing Dr. Faville, Dr. Wilson referred to him as a "mountain of wisdom." Dr. Faville is one of the oldest members of the Virginia State Veterinary Medical Association and one of the oldest graduates in that section of the country, having been graduated from Iowa State College in 1880. In his concluding remarks, Dr. Faville said that by studying and reading one does not have time to grow old.

A. J. SIPOS, *Secretary.*

South Carolina Association of Veterinarians

A meeting of the South Carolina Association of Veterinarians was held in Columbia, S. C., on January 24, 1939. Routine business and matters of current interest to the profession were discussed. It was voted to contribute $25 to the veterinary exhibit at the New York World's Fair.

W. A. Barnette of Greenwood was reëlected for recommendation to the governor for appointment to the state board of veterinary examiners for a period of three years.

In view of the fact that the A.V.M.A. meeting will be held in Memphis, Tenn., and the Southern States Veterinary Medical Association will meet in Columbia early in the fall, it was decided not to hold a meeting this summer.

The following members were elected to office for the current year: Don O. Kitchen of Greenville, president; S. M. Witherspoon of Marion, vice-president; and R. A. Mays (reëlected), secretary-treasurer.

R. A. MAYS, *Secretary.*

Maine Veterinary Medical Association

A meeting of the Maine association was held at Orono, Me., on April 12, J. F. Witter of Orono presiding.

On the afternoon portion of the program, E. C. Moore of Lewiston presented a paper on "Small Animal Parasites—Their Detection and Control." Dean A. L. Deering of the College of Agriculture, University of Maine, invited the Association to meet on the campus. The invitation was accepted and the program continued on the school grounds.

Mr. Ralph Corbett, extension dairyman, outlined the organization of activities of the extension service, making special reference to artificial insemination projects. Following, George M. Potter of Portland brought in a small animal case for examination. A. J. Neal of Bangor and Clyde Dutton of Sanford were in charge of the large animal clinic held in the University's judging pavilion.

Among the many items of business brought up for discussion was a motion that the Asso-

ciation's constitution and by-laws be reorganized and printed for distribution to the members.

Supper was served at the home of Dr. and Mrs. Witter and many of the members and their wives remained for a social evening.

Inland Empire Veterinary Medical Association

The spring meeting of the Inland Empire Veterinary Medical Association was held on May 6 in conjunction with the State College of Washington junior chapter of the A.V.M.A., in the veterinary building at the State College of Washington, Pullman, Wash. Sixty-one veterinarians and a large number of upper classmen of the School of Veterinary Science attended the meeting.

A well balanced and exceptionally interesting program was presented. Reports were made by M. R. Hales and E. T. Powell, directors of the bureaus of animal industry of Washington and Idaho, respectively. E. C. McCulloch of the State College of Washington reported on the cause and prevention of liver fibroses and walking disease of horses in the Walla Walla country of Washington. W. M. Swangard, also of the State College of Washington, discussed trichomoniasis of cattle from the standpoint of the European data on the disease.

Captain Harvey R. Ellis talked on the examination of horses for soundness and demonstrated several types of lameness. Otto Menig of Medical Lake, Wash., spoke on thrombosis of the hepatic vein of horses supposedly affected with equine infectious anemia. E. M. Gildow of the University of Idaho, Moscow, Idaho, demonstrated the electrical method of collecting semen from rams, and F. A. Barber, assisted by the clinical staff of the State College of Washington, discussed and demonstrated the lesions associated with hog cholera and swine erysipelas.

Officers for the ensuing year were elected as follows: J. C. Thompson of Ellensburg, Wash., president; H. M. Beckman of Spokane, Wash., vice-president, and E. M. Gildow of Moscow, Idaho, secretary-treasurer.

Over 250 veterinarians, junior members of the A.V.M.A., and ladies were in attendance at the banquet and dance held during the evening.

E. M. GILDOW, *Secretary.*

Houston Veterinary Association

The regular monthly meeting of the Houston Veterinary Association was held at Frank Hecker's office on June 1. For the first time in the history of the Association the meeting was dedicated to one individual. The occasion was "Merillat night," and L. A. Merillat of Chicago, Ill., executive secretary of the national association, was elected to honorary membership in the Houston group. It was greatly regretted that he was unable to attend the meeting.

J. V. Lacroix of Evanston, Ill., also was made an honorary member, in recognition of his contributions toward the advancement of the veterinary profession.

E. G. Pigman reported on a case of reverse viscera in a yearling heifer; Archie Stallings read a paper on cats; and A. H. Kutchbach spoke on uterine conditions in cattle, making special reference to an unusual case he had handled and describing the surgical technic he had employed.

The regular monthly questionnaire—always a highlight of the meetings—was composed by President Madero N. Bader, E. G. Pigman winning the prize.

It was voted during the business session to purchase a set of "Veterinary Military History of the United States" and to present the books to the Houston public library.

J. GILBERT HORNING, *Corres. Sec'y.*

PERSONAL NOTES

Births

To DR. and MRS. P. L. GAUNT of Richmond, Va., a son, P. L. Gaunt, III, March 30, 1939.

To DR. and MRS. CLARENCE A. WOODHOUSE of Columbus, Ohio, a daughter, Marilyn Jeanne, May 13, 1939.

Activities

MAURICE K. WALTERS (Mich. '34) is city veterinarian for Sturgis, Mich.

H. J. BUNDE (Ont. '39) has located at Sullivan, Wis., and taken over the practice of the late George M. Lynch.

A. D. GLOVER, JR. (Colo. '36) has resigned from the service of the U. S. bureau of animal industry to enter private practice at Canton, Mo.

JAMES W. ARMSTRONG (O.S.U. '34) of Cranston, R. I., was recently appointed state veterinarian to fill the vacancy created by the resignation of J. S. Barber (Chi. '10).

E. C. W. SCHUBEL (U.S.C.V.S. '11) of Blissfield, Mich., discussed diseases affecting steers before the Lenawee County Cattle Feeders on June 3.

J. W. MARSHALL (Ont. '89) of Genoa, Ohio, who underwent an operation for a nervous ailment at the University of Michigan Hospital recently, is able to resume his practice.

CLIFFORD W. WILDER (O.S.U. '35) has resigned his position as veterinary inspector engaged in Bang's disease eradication work, U. S. bureau of animal industry, and is now engaged in general practice at Front Royal, Va.

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